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NATIONAL WATER QUALITY INVENTORY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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This report was prepared pursuant to Section 305(b) of PL 92-500, which states:

"(b) (1) Each State shall prepare and submit to the Administrator by January 1, 1975, and shall bring up to date each year thereafter, a report which shall include—

"(A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this Act (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act) and the water quality described in subparagraph (B) of this paragraph;

"(B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;

"(C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what waters such additional action is necessary;

"(D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and

"(E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the cost of implementing such programs.

"(2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and annually thereafter.

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The 1976 National Water Quality Inventory is an Environmental Protection Agency report to Congress which summarizes State water quality reports to Congress. Major topics included in this report are: Contamination from toxic substances, assessments of the percentage of water currently meeting the goals of the Act and the percentage expected to meet those goals by 1983, and an analysis of the effectiveness of current pollution control programs. Continued water quality problems are reported with excessive bacterial levels limiting recreational uses of water in many areas, high nutrient levels causing eutrophication problems, and low dissolved oxygen levels occurring in many smaller streams which receive large volumes of waste. However, improvements are noted in both bacterial and dissolved oxygen levels in many areas as municipal and industrial treatment plants are installed. The State reports emphasized problem with toxic pollutants, particularly heavy metals, pesticides and industrial chemicals. Special chapters in this report describe pollution problems in the Great Lakes and provide a summary of problems from oil spills.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

June 27, 1977

Dear Mr. President:
Dear Mr. Speaker:

I am transmitting to the Congress the National Water Quality Inventory Report for 1976, as required by Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). It is the third in a series of reports prepared by the EPA in cooperation with the States and other Federal agencies. It includes, for the second time, reports from the States and other jurisdictions of the United States. Reports from 46 of the 50 States and from five of the six other jurisdictions have been received and are being transmitted.

I am particularly concerned because the State reports this year provide further evidence that toxic materials are a very serious problem in the Nation's waters. The reports place more emphasis than previous ones on the problems associated with toxic pollutants such as heavy metals, pesticides, and industrial chemicals. This increased emphasis reflects greater awareness of the extent to which these substances are found in the environment. Despite the fact that much more information is required before a complete national assessment of the problem can be performed, the data which are available indicate that control measures for toxic pollutants are urgently needed. The States, the EPA, and the National Commission on Water Quality all agree on this point.

A key element of our program for controlling toxic substances is to revise our regulations defining the best available control technology economically achievable (BAT) specifically to control toxic materials. For this reason, we believe that BAT limitations regarding toxics should be established and implemented as soon as possible, but not later than 1983. More stringent controls will be applied only where the technology-based standards are insufficient to protect human health or aquatic life or to meet other water quality standards.

The concern over toxic materials should not overshadow the many successes achieved in cleaning up difficult pollution problems. Our report presents profiles of 17 areas across the country where pollution control programs have succeeded in reestablishing significant beneficial water uses. These are only a sample of the many successes which have been reported to us. In addition, the report points out that many States expect further significant improvements from the control programs currently being implemented.

Sincerely yours,

Barbara Blum Acting

Douglas M. Costle

Honorable Walter F. Mondale
President of the Senate
Washington, D.C. 20510

Honorable Thomas P. O'Neill, Jr.
Speaker of the House of Representatives
Washington, D.C. 20515

Acknowledgment

The major portion of this report is based on submissions from 45 of the 50 States and from five of the six other jurisdictions of the United States. The Environmental Protection Agency greatly appreciates the time and effort expended by State and local agencies and by regional commissions in preparing these reports.

The following individuals from the EPA also made significant contributions during the preparation of this report: William Nuzzo (Region I); Harry Allen (Region II); Gerald Pollis (Region III); Al Herndon (Region IV); Steve Dudas, John Wilson (Region V); Tom Reich (Region VI); Dale Parke (Region VII); Patrick Godsil (Region VIII); Norman Lovelace (Region IX); William Schmidt (Region X); and others in the EPA's regional offices; Robert Arvin, Adelaide Lightner, Alexander McBride and Mark Sweers, Monitoring and Data Support Division; Henry Vancleave, Oil and Special Materials Control Division; and others too numerous to mention who were, nevertheless, instrumental in contributing to the final product. Finally, the information on oil spills was collected and analyzed by GKY & Associates.

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EXECUTIVE SUMMARY

Scope

This report, the third in the series of *National Water Quality Inventory* reports, was prepared jointly by the U.S. Environmental Protection Agency (EPA), by 46 of the 50 States, and by five or six other jurisdictions of the United States. The submissions from the States and other jurisdictions are being transmitted to Congress in their entirety under separate cover. This report summarizes the State submissions and provides a national overview of water quality. It was prepared pursuant to Section 305(b) of the 1972 Federal Water Pollution Control Act Amendments (Public Law 92-500) (see inside front cover).

Many of the 1976 State reports provided more specific and comprehensive assessments of water quality and related programs than did last year's initial efforts. In general, however, the primary emphasis was on topics which were not thoroughly covered in the 1975 reports. Several States which presented thorough analyses last year submitted only brief updates for their 1976 reports. Therefore, readers who wish to review the individual State reports should obtain copies of both the 1975 and 1976 reports.

The topics which received the greatest amount of additional coverage this year are toxic substances, quantitative assessments of the percentage of waters currently meeting the goals of the Act and the percentage expected to meet those goals by 1983, and analyses of the effectiveness of current pollution control programs.

The State information was supplemented by two additional studies:

- An analysis of water quality conditions in the Great Lakes; and,
- An analysis of data on oil spills.

Summary

In their discussions of current water quality and recent trends the States, for the most part, reiterate the conclusions found in the 1974 and 1975 *National Water Quality Inventory* reports. Excessive bacteria levels which limit recreational uses of water are the most widely reported problem, particularly near urban areas, with high nutrient (phosphorus and nitrogen) concentrations also reported throughout many areas. Low dissolved oxygen levels are a problem primarily in smaller streams receiving large volumes of wastes.

Improvements in bacteria and dissolved oxygen levels are being reported in many areas as municipal and industrial treatment plants are being installed or upgraded. Reduced phosphorus loads are also being reported, particularly in the Great Lakes area, following the implementation of phosphate detergent bans and/or phosphorus removal at sewage treatment plants.

Toxic Pollutants

In their 1976 reports, the States place a much greater emphasis on the problem of toxic pollutants, particularly heavy metals, pesticides, and industrial chemicals. This increased emphasis is due primarily to recent evidence indicating how widespread the problems with these substances have become. However, the States noted that there are still many areas where there is little or no information available on toxic pollutant levels.

Problems with heavy metal contamination were reported by 35 States. The principal sources of heavy metals include industrial discharges, urban runoff, erosion of soils rich in metals, and rock deposits containing metals which dissolve in the water. Of these sources, industrial discharges and urban runoff have the greatest effects on water quality in most areas except for those regions where mining activity is significant.

Eighteen States across the country reported problems with pesticides in the water, in sediments, or in fish tissues. However, some States did describe significant improvements following the implementation of controls on certain pesticides. For example, Michigan reports that DDT residues in fish were reduced by over 50 percent after controls were implemented.

Pollution from toxic industrial chemicals was reported by 16 States, including all of the Great Lakes States. Fish tissues containing polychlorinated biphenyls (PCB) residues above the Food and Drug Administration tolerance level were found in three of the Great Lakes. The most commonly reported chemicals were phenols, PCB's, and cyanide.

Attainment of Water Quality Goals

Under PL 92-500, the national goal to be achieved by July 1, 1983, wherever attainable, is "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water." This year, 14 States compared current conditions relative to the goal with the conditions they projected for 1983. While the data presented do not provide an adequate basis for deriving a composite nationwide quantitative assessment, they do indicate that most of the 14 States expect significant improvements by 1983, and that, in terms of traditional pollutants, well over 90 percent of their waters are projected to achieve the goals of the Act at most times. These estimates, however, are not able to account for potential problems from toxic pollutants which may be discovered when more monitoring data become available.

Evaluation of Control Programs

Many of the States discuss the effectiveness of the control programs mandated by PL 92-500, both with regard to the legislation itself and to the EPA s implementation of the Act. Much of this discussion was precipitated by the recent report and recommendations of the National Commission on Water Quality (NCWQ).

The States, the EPA, and the NCWQ all agree that there should be a fixed schedule for future federal funding of municipal sewage treatment facilities. The NCWQ recommended between $5 billion and $10 billion per year for five to ten years. State recommendations also fall within those ranges. The States, the EPA, and the NCWQ also agree that the States should have greater responsibility for managing the construction grants program

There is considerably less agreement concerning future controls on industrial discharges. The NCWQ recommended that case-by-case extensions or exemptions be allowed from the 1977 level (BPT) treatment requirements of the Act and that the 1983 level (BAT) treatment requirements be postponed for five to ten years. The States which discuss the issue generally do not agree with the proposal to allow exemptions from BPT, although a few do feel that extensions will be necessary in some cases. Most of them believe that a review of BAT costs and benefits should be done before the requirements are implemented. The EPA agrees with the States that exemptions from BPT are not warranted. However, in light of the current agency emphasis on BAT as a means of controlling toxic pollutants (as reflected in a recent court settlement), the Agency feels that BAT limitations regarding toxics should be established and implemented as soon as possible, but not later than 1983. The EPA agrees that BAT required should be reviewed for pollutants other than toxics (see Chapter II for a more complete discussion of this issue).

CHAPTER I

CURRENT WATER QUALITY AND RECENT TRENDS

The 1975 State report provided a large volume of useful water quality information, particularly with regard to conditions and trends for the traditional pollution indicators such as dissolved oxygen and turbidity. However, as initial efforts, there were inevitable gaps in the information provided, in particular concerning the degree of presence of toxic substances and the relationships between reported water quality and the uses which those waters will support. This year's reports go a long way toward filling those two gaps.

Overall Evaluation of Conditions and Trends

The 1976 reports generally support and reinforce the conclusions that the States reached last year; namely that many areas of the country are showing notable improvement with regard to those parameters which have been the focus of pollution control efforts, despite the fact that severe problems do remain. Chapter II presents a sample of areas across the country where pollution abatement has been successful in significantly upgrading water quality conditions. These examples are all described in the 1975 or 1976 State reports.

Twenty-one States presented Statewide evaluations of water quality relative to either State standards, the 1983 goals of the Act, or both (Table I-1). These States did not all use the same basis for evaluating compliance with water quality standards, and their results reflect the different approaches taken.

The five States which assessed the quality of total stream mileage all reported 90 percent or more to be meeting State standards or the goals of the Act (Table I-1). The results from the eight States which evaluated the mileage of only major streams are not as optimistic (Table I-1), especially considering that major streams are generally those with the most potential beneficial uses. Vermont shows only 62 percent of the major stream miles meeting goals as compared to 92 percent of the total stream miles, and the difference for Connecticut is even greater, 51 percent as compared to 93 percent. Georgia reports that many of the streams not meeting criteria are the major ones.

The most common method of assessing water quality was to determine the percentage of streams or stream segments which met standards. For the eleven States using this approach, the number of waterbodies assessed varied from 23 segments in Delaware to 1,000 streams in Mississippi. The use of stream segments may tend to overstate problems or otherwise obscure the situation because only a small portion of a segment may be violating goals or standards. Thus, while Virginia reports that 92 percent of its total stream miles currently meet the goals of the Act, only 41 percent of the segments meet those goals.

The data in Table I-1 do not provide a sufficient basis for developing a composite nationwide assessment of water quality relative to either State standards or the 1983 goals of PL 92-500. However, it is apparent that many of the major streams in both the industrial areas such as New England and, to a lesser extent, the agricultural or rural areas such as Nebraska or Idaho currently are not meeting the goals of PL 92-500.

Traditional Problems — Suspended Solids, Oxygen Depletion, Bacteria

The 1976 State reports place comparatively less emphasis than the 1975 reports on the most commonly measured and reported pollution problems, suspended solids (which are commonly reported as turbidity), oxygen depletion, and bacteria. Nevertheless, these problems are still widely reported and described.

TABLE I-1

PERCENTAGE OF STATE WATERS MEETING STANDARDS

	1983 goals	State standards
Based on total stream miles		
Connecticut (8,394 miles)	93	93
Georgia (20,000 miles)	90	
North Carolina (39,974 miles)		94
Vermont (4,936 miles)	92	92
Virginia (27,240 miles)	92	
Based on major stream miles		
Connecticut (497 miles)	51	51
Maine (1,907 miles)	62	90
Massachusetts (1,462 miles)	26	31
New Hampshire (1,280 miles)	54	55
Pennsylvania (14,163 miles)		79
Rhode Island (329 miles)	64	92
South Carolina (1,642 miles)	75	
Vermont (1,103 miles)	62	64
Wisconsin (3,360 miles)	91	
Based on streams or segments		
California (94 major rivers)	78	
Delaware (23 segments)	48	
Idaho (220 segments)	40-45	
Kansas (62 segments)		89
Minnesota (27 major rivers)	78	
Mississippi (1,000 streams)	92	
Nebraska (not specified)	70	
Tennessee (642 segments)	47	47
Texas (297 segments)	67	
Virginia (148 segments)	41	

Suspended Solids

High levels of suspended solids can be harmful to aquatic life by reducing light penetration required for plant growth and by covering bottom organisms and breeding areas with sediment. In addition, they can reduce the recreational value of waters by making them unsuitable for swimming or by lowering their aesthetic appeal. Furthermore, certain industrial and agricultural water uses can be adversely affected by excess suspended solids levels.

The major source of suspended solids is erosion. Natural erosion can be greatly aggravated by human activities, such as agriculture, silviculture, mining, urban runoff, and construction. Almost every State mentions at least some problems due to erosion from agricultural lands, although widespread problems are noted primarily in the Midwest and West Coast States. Many States are implementing some form of erosion control program, principally with the assistance of the U.S. Department of Agriculture Soil Conservation Service, and the effect these programs can have is very significant. Data from the Connecticut report shows that the erosion rate from adequately managed cropland is only about one fourth of the erosion rate for inadequately managed cropland (Table I-2).

Increased runoff from harvested areas and

TABLE I-2

ESTIMATED ANNUAL POTENTIAL SOIL LOSS IN CONNECTICUT

Land use activity	Acres	Erosion Rate (tons/acre/year)		Total Soil Loss (tons/year)
Natural Land				
Woodland	1,912,271*	.11*		210,349*
Streambanks	12,542[1]	75.35[2]		945,039*
Agriculture				
Active Cropland				
Adequately managed	46,129	2.73*		125,932
Inadequately managed	116,871	10.77*		1,258,700
Lumbering	10,000	N.A.		N.A.
Construction				
Residential	6,954	185.2		1,287,880
Non-residential	3,264	185.2		604,492
Urban	512,500	.86*		
Transportation				
Construction	N.A.	N.A.		37,000
Roadbanks (after construction)	39,099[1]	6.92		242,183
Sanding				
Town roads,				614,000
deposited				−257,000
Town roads,				
swept and cleaned			Net	356,500
State highways,				316,250
deposited				
State highways,				−168,750
swept and cleaned			Net	147,500
	Sanding, Statewide		Net	504,000

*Information from U.S. Soil Conservation Study.
1. Units are bank miles (SCS figures).
2. Units are in tons/bank miles/year (SCS figures).
N.A. = figures are not available.

transport roads are the major problems associated with silvicultural activities, which are primarily located in the southern and far western areas of the country (Figure I-1). Large-scale mining activities which contribute significant loadings from disposal piles and spoil banks are found in several areas across the country, with the major concentrations being near the Appalachian and Rocky mountains (Figure I-2). States other than those indicated in Figures I-1 and I-2 do report problems associated with silviculture and mining, but the problems are not generally severe or widespread.

Urban runoff and construction activities contribute large loadings of suspended solids in localized areas across the country. Construction activities in particular cause very high erosion rates. For example, Connecticut reports that the erosion rate for construction areas is many times higher than for other types of areas (Table I-2).

Large point source discharges from certain industries and from municipal plants with inadequate treatment can also cause significant increases in suspended solids, especially in streams where the natural background levels are low. This situation is most prevalent in the New England area, although improvements are occurring.

Oxygen Depletion

Oxygen depletion caused by oxygen-demanding organic loads can reduce dissolved oxygen to levels below the concentrations necessary to support aquatic life. In extreme cases dissolved oxygen depletion can result in anaerobic conditions with extensive fish kills and severe odor problems.

Low dissolved oxygen levels are primarily a problem where large municipal or industrial organic waste loads are discharged into smaller streams which are unable to assimilate these wastes. Wastes from pulp and paper mills have historically been a major contributor to dissolved oxygen problems, although the implementation of effective control measures has greatly reduced the problems from this industry. Maine, New Hampshire, Georgia, Oregon, Washington, and Alaska are among the States reporting large improvements in dissolved oxygen levels following the installation of treatment plants at pulp and paper mills.

Urban runoff also contributes significant oxygen-demanding loads, although these loads are not as common a problem in reducing dissolved oxygen levels since they usually occur at higher flows. Natural conditions leading to dissolved oxygen depletion include the high organic loads and low flows in swamp areas, and the low flows and decreased potential for reaeration caused by winter ice cover in northern streams.

Bacteria

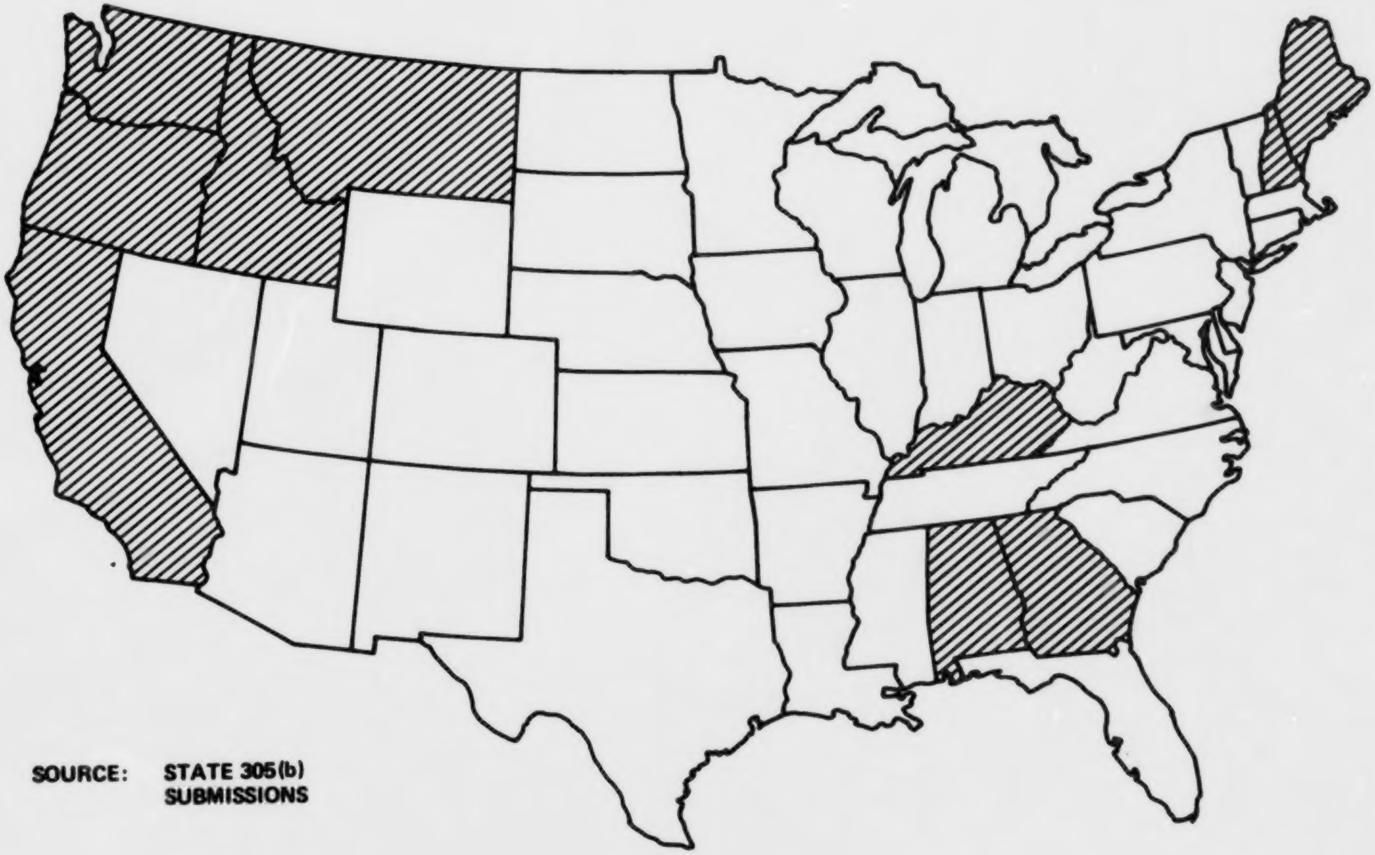
The most widely reported water pollution problem is excess concentrations of fecal coliform bacteria, which are indicators of harmful pathogens which make waters unsafe for human contact recreation. For example, Illinois reports that the criteria for primary contact recreation was exceeded at least once at 98 percent of its sampling stations which measured bacteria levels. The Kansas report points out that criteria are exceeded between 50 percent and 90 percent of the time in most of its streams.

The sources of these bacteria include inadequately treated municipal effluents, combined sewer overflows, urban stormwater, feedlot runoff, runoff from grazing lands, inadequately installed private treatment systems (primarily septic tanks), and natural sources such as migrating water fowl which congregate in large numbers at certain streams or lakes. Some of these sources such as municipal plants, inadequate private systems, and feedlots can be controlled, although often at a significant cost. Others are much more difficult to control. The major sources of bacterial contamination vary with land use and geographical location; however, for most parts of the country, urban areas are the primary problem. The extent to which urban point sources as opposed to nonpoint sources are the major contributors of excess bacteria was not assessed for most areas of the country.

It should be noted that several States, including Alabama, Kansas, Nebraska, and New Mexico believe that many of their rivers are not suited for swimming even in their natural states because of channel geometries, high flow rates, high natural turbidity, or high background levels of bacteria. For these rivers, the States point out that exceeding the criteria levels for fecal coliform bacteria does not preclude any existing or potential beneficial uses of those waters.

FIGURE I-1

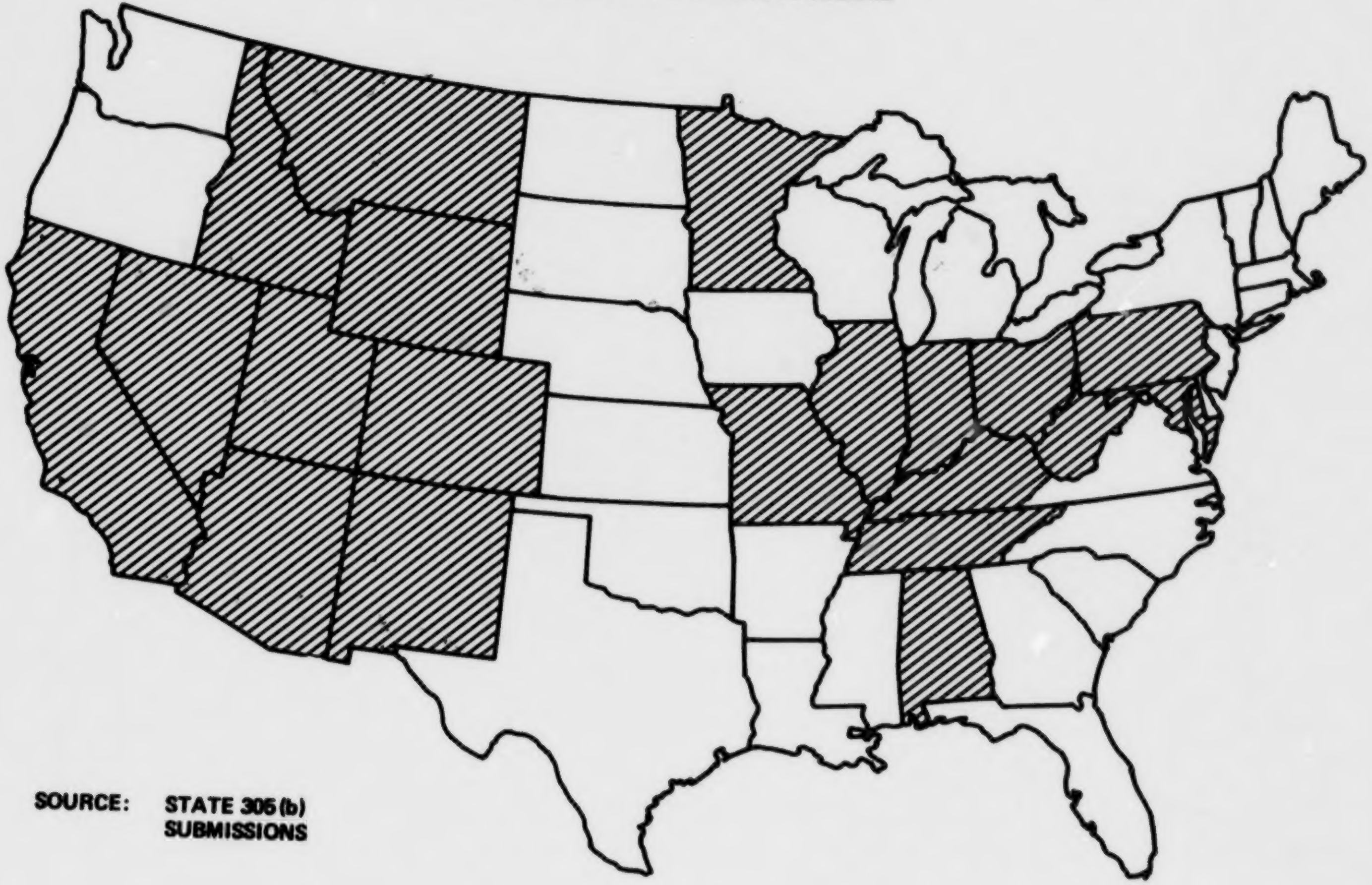
STATES REPORTING SILVICULTURE PROBLEMS



SOURCE: STATE 305(b) SUBMISSIONS

FIGURE I-2

STATES REPORTING MINING PROBLEMS



SOURCE: STATE 305(b) SUBMISSIONS

Eutrophication

The 1976 State reports place much greater emphasis and contain much more information on the magnitude of problems caused by high levels of phosphorus and nitrogen, which are the primary plant nutrients that control productivity. Excess nutrient levels accelerate the eutrophication or aging process of lakes and reservoirs by stimulating the growth of algae and other aquatic plants. In advanced stages, eutrophication can lead to dissolved oxygen depletion and odor problems from decomposing algae and other plants.

Several States, including Vermont, Maryland, and Florida report that high nutrient levels are their most serious water quality problem. In addition, 16 States provided special sections describing the trophic conditions of lakes and reservoirs within their boundaries (Table I-3).

TABLE I-3

STATES REPORTING ON
LAKE EUTROPHICATION CONDITIONS

Alabama
Arizona
Delaware
Georgia
Kentucky
Maine
Michigan
Minnesota
Mississippi
New Hampshire
New Mexico
New York
Ohio
Vermont
Washington
Wisconsin

Both phosphorus and nitrogen are found in municipal and industrial discharges and in urban and rural runoff, particularly runoff containing fertilizers. However, phosphorus is generally the nutrient which needs to be controlled to reduce eutrophication problems, and the ratio of phosphorus to nitrogen is much higher in sewage treatment plant effluents than in most runoff. Therefore, controlling phosphorus discharges from sewage treatment plant effluents is expected to have significant benefits in reducing eutrophication problems in heavily populated regions.

For this reason, several States have implemented or are considering bans on detergents containing phosphates above a certain level. Indiana reports that sewage treatment plant phosphorus loads were reduced by 56 percent and total stream loadings by 25 percent to 30 percent following the implementation of a Statewide ban on phosphate detergents. Minnesota and Vermont estimate that similar reductions would occur with a phosphate ban in effect, although the fact that the phosphate content of detergents has been declining over the last few years would indicate that the improvements from a ban might not be as great as in the past. Michigan, New York, and Ohio also report significantly lower phosphorus levels following State or local bans or limitations on phosphate detergents.

Geographically Related Problems — Acid Mine Drainage, Excess Salinity

Certain types of water pollution problems are related to factors which vary with geographical location. These problems generally result from a combination of natural background conditions and human activities. Two of the most serious of these problems are acid mine drainage and excess salinity.

Acid mine drainage occurs when mining operations expose sulfur-bearing rock to air and water, the water coming either from runoff or from underground sources. The exposed minerals containing sulfur combine with the air and water to form sulfuric acid, which then drains into nearby streams where it seriously damages all forms of aquatic life. The areas most affected are those where extensive coal mining operations have occurred, principally the Appalachian Mountain States, Illinois, and several of the Rocky Mountain States. As an indication of how severe this problem can be, Pennsylvania reports that: "Abandoned mine drainage, either by itself or in combination with other pollution sources, is responsible for 75 percent (2,240 miles) of the steam miles degraded (in the State)."

A second geographically-related form of pollution is excess salinity. High levels of dissolved minerals can make water unfit for human consumption, irrigation, livestock watering, or other uses. Large changes from natural salinity levels can adversely affect aquatic life. Salinity problems are generally found in the more arid areas of the country such as the central and southwestern States. There, naturally high salinity levels are further increased by irrigation return flow, which often add significant amounts of dissolved solids. In addition, several southwestern States such as Texas and Oklahoma report that the disposal of brines used in drilling for oil has caused severe salinity problems in certain areas, although the implementation of control measures has significantly reduced the problems in some of these areas.

Another way in which human activity can increase salinity levels is through excessive consumption of fresh waters, particularly groundwaters, which results in the intrusion of saline waters into fresh water areas. This problem occurs both in coastal areas and in comparatively dry inland areas (Figure I-3).

Toxic Substances

Over the past few years there has been an increasing concern over the presence of significant quantities of toxic substances in the nation's waters. These substances include heavy metals such as arsenic, cadmium, chromium, lead, mercury, and zinc; industrial chemicals such as cyanides, phenols, and PCB's; pesticides such as DDT, chlordane, aldrin, and dieldrin; and other chlorinated hydrocarbons. They can cause death or reproductive failures in fish and wildlife, and can be carcinogenic or cause other severe health problems in humans. Many of them accumulate and concentrate in the food chain. Some, such as PCB's, are highly persistent, and once released into the environment, can remain for decades.

The increased concern with toxic substances was reflected by the greater degree of monitoring and reporting which was devoted to them for this year's reports as compared to last year's. Almost every State at least mentioned some type of toxic problem, although many of them pointed out that more monitoring data were needed to provide an adequate assessment of the problem of toxic pollutants.

The most commonly described toxic problem was heavy metals (Table I-4). Metals problems are particularly widespread because they can come from many different sources. The States east of the Mississippi generally report that excess toxic metal concentrations are due to industrial discharges, urban stormwater runoff, and atmospheric fallout of air pollutants. For example, Massachusetts describes high metals concentrations in the Blackstone, Hoosic, Ten Mile, and Westfield Rivers which are attributed to specific industrial dischargers. New York, which has one of the most comprehensive monitoring programs for toxics, reports high concentrations of mercury and other metals in the waters around New York City due to urban runoff. Most other eastern States report similar types of problems, with the primary emphasis being on industrial discharges.

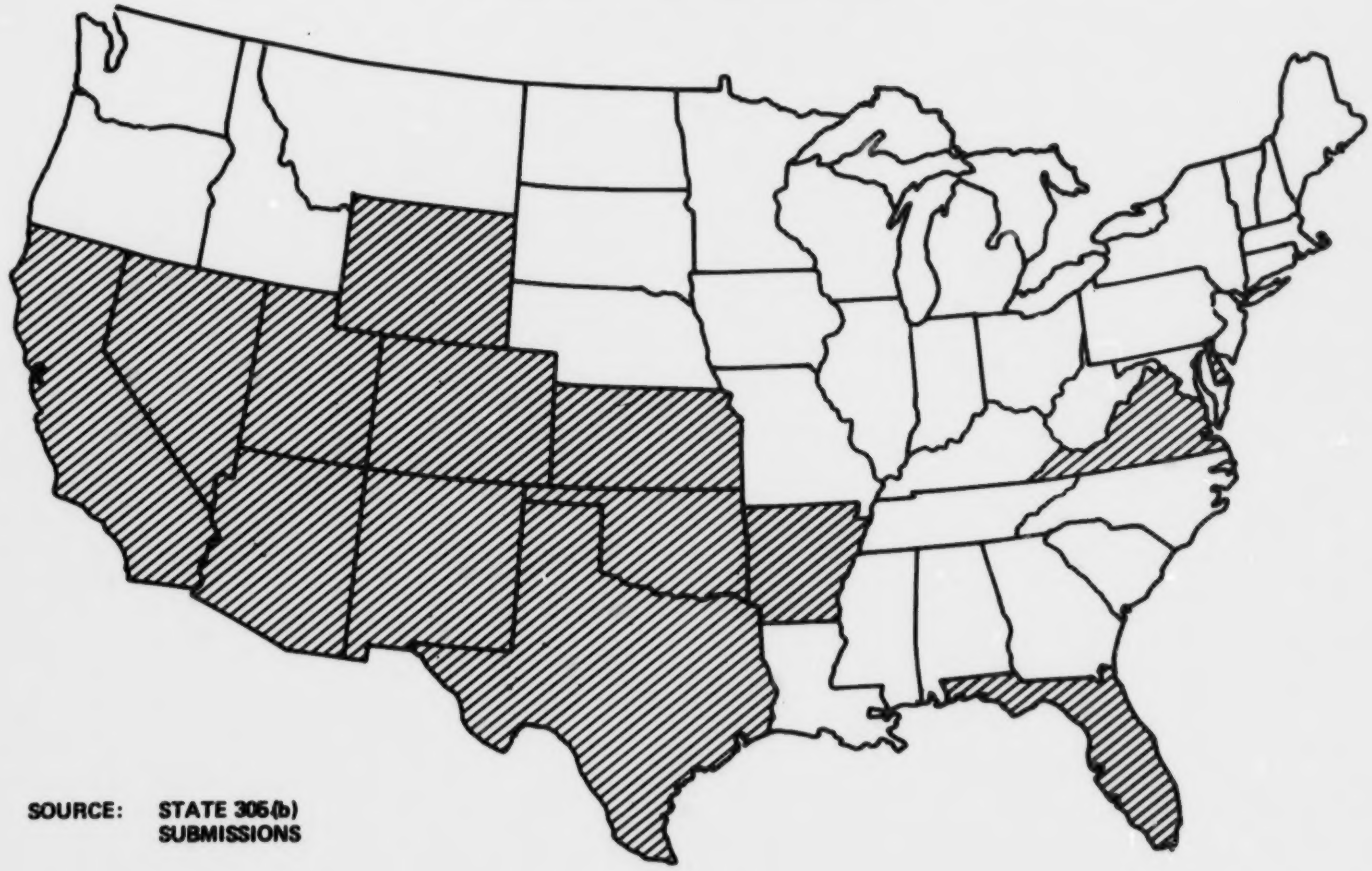
Western States, on the other hand, point to active and abandoned mining operations as their primary source of metals contamination. Colorado, Idaho, Arizona, California, Nevada, and South Dakota all describe this particular problem as it affects their waters. Excess metal concentrations also results from natural conditions. High arsenic levels in the Yellowstone River in Wyoming and Montana are from natural rock formations. Other States report rock deposits containing lead or other metals which can cause water quality problems. The most common natural cause of standards violations for metals, particularly iron, is erosion of soils containing those metals. However, if the metal remains in suspended form the problem is usually not severe. Metals are particularly toxic to aquatic life only when they become dissolved in the water, as is usually the case with metals from industrial discharges and urban runoff.

The second most widely discussed types of toxic pollutants are pesticides. Eighteen States representing all regions of the country reported pesticide problems (Table I-4). In the eastern States pesticide loadings are associated with agricultural runoff, whereas in the more arid western States, irrigation return flows are a major source of pesticide pollution. The harmful effects of DDT and certain other pesticides to fish, wildlife, and humans have been well documented. For this reason, DDT, aldrin, and dieldrin have been banned for almost all uses by the EPA. The State of Michigan, which had placed controls on DDT prior to EPA, presented data in its 1975 report which showed that between 1970 and 1973 the DDT levels in Lake Michigan fish were reduced by 50 percent to 75 percent depending on the species.

Certain industrial chemicals, such as cyanides

FIGURE I-3

STATES REPORTING SALINITY PROBLEMS



SOURCE: STATE 305(b) SUBMISSIONS

TABLE I-4
TOXIC POLLUTANTS REPORTED BY STATES

State	Heavy metals	Pesticides	Phenols	Cyanide	PCB's	Other or unspecified
Alabama		x				
Alaska						x
Arizona	x					
Arkansas	x	x				
California	x	x				x
Colorado	x					
Connecticut	x	x			x	
Delaware	x		x			
Florida	x					
Guam	x					
Hawaii	x					
Idaho	x	x				
Illinois	x	x	x	x	x	
Indiana	x		x	x	x	
Kansas						x
Kentucky	x					x
Maine	x	x	x			
Maryland	x					
Massachusetts	x	x			x	
Michigan	x	x	x		x	
Minnesota	x		x		x	
Mississippi	x	x				x
Missouri	x					
Montana	x	x				x
Nevada	x			x		
New Hampshire		x				x
New Mexico	x					x
New York	x	x	x		x	
North Carolina	x		x			
Ohio	x	x	x	x		x
Oklahoma	x			x		
Pennsylvania	x					x
South Carolina	x					
Tennessee	x	x	x	x		
Texas	x	x				
Trust Territories						x
Utah	x					
Vermont						x
Virginia	x	x				
Washington						x
West Virginia	x		x			
Wisconsin	x	x			x	
Wyoming	x					x

Note: Some toxic pollutant problems may not be reported because of insufficient data.

and phenols, have been recognized as water pollutants for some time, and several of the Northeast and Great Lakes industrial States such as New York and Indiana have noted improved conditions as discharges of those materials are brought under control. A more recently discovered problem has been that of PCB contamination. PCB's have been used for years as a dielectric fluid in electrical capacitors and transformers and for numerous other industrial applications. Their adverse health effect on humans was confirmed in 1968 when 1,000 people in Japan were severely affected after ingesting rice oil contaminated with PCB's. Japan has since banned all manufacture, importation, and most uses of the substance. The main problem with PCB's is their persistence; it takes decades for them to decompose, and millions of pounds have already been released in the environment. Therefore, even though their use has been greatly restricted, especially in the Great Lakes area, improvements in levels found in sediments and fish tissues will take years. By far the most efficient way to control new substances such as PCB's in the future is to regulate them at the source before they enter the environment. This approach is being taken in the recently passed Toxic Substances Control Act, which also bans the manufacture of PCB's after two years.

Finally, a few States mentioned the problem of carcinogenic chlorinated hydrocarbons which have recently been discovered in drinking water supplies for 78 cities across the country. These substances often result from the reaction of the chlorine used to disinfect water with other materials in the water. The extent to which these compounds occur in water other than drinking water supplies has not been established.

Biological Monitoring

In their reports, 25 States described or presented the results of biological monitoring activities they are conducting (Table I-5). The studies ranged from simple comparisons between the size of fish caught at different locations to Statewide evaluations of complex species diversity indexes. This type of analysis is extremely useful in assessing the effects of pollution control efforts since it describes water quality in terms of the actual goals of the Act ("water quality which provides for the protection and propagation of fish, shallfish, and wildlife . . . ") rather than in terms of chemical constituents. The States did find that biological and chemical indicators of water do generally agree with each other, although there were situations where, despite a cleanup of pollutants as indicated by chemical analyses, aquatic life had not yet been fully reestablished.

TABLE I-5

STATES REPORTING ON
BIOLOGICAL MONITORING PROGRAMS

Alabama
Arizona
Connecticut
Delaware
District of Columbia
Florida
Georgia
Hawaii
Illinois
Indiana
Kansas
Maine
Maryland
Michigan
Missouri
New York
North Carolina
Pennsylvania
Rhode Island
South Carolina
Texas
Trust Territories of the Pacific
Vermont
Virginia
Wisconsin

CHAPTER II

WATER QUALITY GOALS AND CONTROL PROGRAMS

The 1972 Federal Water Pollution Control Act Amendments (PL 92-500) state that: "The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." One of the goals to be achieved in attaining this objective is that " . . . wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for the recreation in and on the water be achieved by July 1, 1983." This interim goal is generally referred to as "fishable and swimmable" water quality.

In their 1976 reports, the States were generally much more specific than in 1975 in their evaluations of the feasibility and desirability of the 1983 water quality goals specified in PL 92-500, and in their estimates of what percentage of their waters could be expected to meet those goals after the implementation of the control program specified in the Act. Those control programs include the implementation of secondary treatment by 1977 and of best practicable waste treatment technology (BPWTT) by 1983 for municipal sewage treatment plants, and the implementation of best practicable control technology currently available (BPT) by 1977 and of best available control technology economically achievable (BAT) by 1983 for industrial dischargers.

As of February 28, 1977, the EPA had obligated $12.4 billion of the $18 billion authorized under PL 92-500 for municipal facilities construction. It is estimated that one-third of the 12,800 municipal plants currently in operation will provide secondary or some higher level of treatment by 1977/78. All major industrial permits and almost all minor ones have been issued, and most dischargers are expected to be in compliance with BPT by 1977/78.

Estimated Attainment of the 1983 Goals

Chapter I presented data from 21 States on current water quality conditions relative to State standards or the 1983 goals. Fourteen of these States also estimated what percentage of their waters would achieve the 1983 goals after implementation of the control programs called for in the Act (Table II-1). Problems concerning the different bases for assessment of those percentages were mentioned in Chapter I. In addition, most States which provided projections only estimated future levels of the more common pollutants. Toxic pollutant levels could not be projected primarily because of the lack of data available.

With these limitations in mind, most of the 14 States report that they expect a high percentage of their waters to achieve fishable and swimmable standards by 1983. Vermont's and Rhode Island's relatively low expected percentages for major stream miles are due in part to those States' policy of considering segments below sewage treatment plants as unfit for swimming regardless of treatment levels because of the possibility of a malfunction in the treatment system. Nebraska expects its percentage to increase to over 90 percent after 1983 as additional funding becomes available. Therefore, it appears that well over 90 percent of the waters of at least these 14 States can be expected to achieve the goals of the Act at most times, and where the goals will not be met, these States report that human-induced nonpoint source pollution and natural conditions are generally the limiting factor.

The results presented in Table II-1 also indicate that marked improvements are expected in many States between now and 1983. This is

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TABLE II—1

PERCENTAGE OF WATERS MEETING 1983 GOALS

	Current	By 1983
Based on total stream miles		
Georgia (20,000 miles)	90	95
Vermont (4,936 miles)	92	96
Virginia (27,240 miles)	92	99.7
Based on major stream miles		
Maine (1,907 miles)	62	91
New Hampshire (1,280 miles)	54	95
Rhode Island (329 miles)	64	71
Vermont (1,103 miles)	62	82
Wisconsin (3,360 miles)	91	98
Based on streams or segments		
California (94 rivers)	78	91
Delaware (23 segments)	48	96
Minnesota (27 rivers)	78	89
Mississippi (1,000 streams)	92	99.7
Nebraska (not specified)	70	85
Tennessee (642 segments)	47	94
Texas (297 segments)	67	96
Virginia (148 segments)	41	99

especially true in those areas, such as New England, where point source discharges are the major cause of water quality problems. However, several States in the less populated central and western areas of the country do not expect such dramatic improvement from current programs. For example, Montana reports that of the 4,000 miles of streams with water quality problems (total stream mileage in Montana is not known), only about 100 miles will be improved by further point sources controls. Arizona believes that further point source controls will probably not significantly upgrade the six segments in the State which do not meet water quality standards. However, Arizona does emphasize the need for a strong program to protect against future water quality degradation from anticipated rapid population growth in several areas.

The principal reasons for not meeting the fishable and swimmable goals by 1983 in all waters were described in detail in the 1975 report. They include: 1) Discharges to very low flow streams where waste waters are a large percentage of the total stream flow, and it is not technologically or economically feasible to reduce pollutant loads to the levels necessary to meet water quality goals; 2) urban stormwater runoff; 3) agricultural runoff and irrigation return flows; 4) abandoned mine drainage; 5) in-place pollutant deposits; and 6) insufficient funding. Some waters which will not meet the goals by 1983 should meet them at a later date as nonpoint source controls are developed and implemented, and as funding becomes available.

Point Source Control Programs

Many States addressed policy aspects of the point source control programs called for in PL 92-500, partly because of anticipated programs called for in PL 92-500, partly because of anticipated Congressional action on amendments to PL 92-500 and also in response to the National Commission on Water Quality report and recommendations which were submitted to Congress in April, 1976.

The National Commission made the following recommendations concerning municipal and industrial pollution control requirements. For municipal treatment plant construction the Commission recommended that between $5 billion and $10 billion per year be authorized over the next 5 to 10 years. Also, municipalities should be granted extensions to their permit requirements for implementation of secondary or more advanced treatment until funding is available. In addition, exemptions from required treatment should be allowed in cases where secondary treatment is not required to protect water quality, particularly those cases involving deep ocean outfalls.

For industrial dischargers, the Commission recommended that case-by-case extensions or exemptions be permitted from the BPT limitations now required for July1, 1977 in situations where severe economic impacts might occur. In addition, it was recommended that the BAT limitations, now required for July1, 1983 be postponed for 5 to 10 years until the effects on water quality of the BPT limitations could be assessed. At the same time, the Commission called for the control of toxic pollutants by 1980. Finally, the Commission recommended that the goal of zero discharge of pollutants by 1985 be replaced by a goal emphasizing reutilization of resources.

All of the States which discussed the issue agreed with the funding recommendations for municipal treatment plants. These states reported that the lack of a definite construction grant funding schedule made the task of developing meaningful water quality management plans very difficult. Many States also agreed either explicitly or implicitly with the idea of extending the deadline for municipal plants to meet secondary treatment requirements. The States pointed out that State and local governments were not willing to fund large scale treatment plants on their own when they would be eligible for 75 percent federal funding by waiting until funds became available.

The issue of requiring secondary treatment when alternative, less expensive treatment methods (such as lagoons or ocean outfalls) would be sufficient to protect water quality is also discussed by several States including Rhode Island, Alabama, and Arizona. This issue is part of a more general issue raised by about a dozen States concerning the degree to which the States should be able to define the priorities for construction grants spending. The EPA has recently amended its definition of secondary treatment to drop the universal requirement for disinfection, which generally consists of chlorination. Disinfection is now required only when necessary to protect receiving water quality and beneficial uses. The EPA has also proposed an amendment to PL 92-500 which would place more of the responsibility for reviewing construction grant applications with the States.

The States were not as supportive of the National Commission recommendations concerning industrial dischargers. Only Rhode Island and Alaska raised the possibility of significant local unemployment problems resulting from BPT requirements and Alaska emphasizes that limitations should remain stringent enough to meet water quality goals. While a few States pointed out that in some cases achieving BPT effluent limitations is not necessary to protect water quality, others, such as Michigan, pointed out that requiring uniform minimum levels of treatment would help to maintain competitive positions within industry groups. Furthermore, the Idaho report stated: "It appears that applications for waivers or modifications (of BPT effluent limitations) on a case-by-case basis could result in an administrative nightmare for the U.S.E.P.A." A third comment on allowing exemptions from BPT standards comes from the Wisconsin report: "Indeed, to back away from established goals at this point would effectively penalize firms and communities which have acted responsibly in meeting their obligations." However, Idaho and Ohio were in favor of allowing extensions of BPT permits beyond the 1977 statutory date because of delays in issuing guidelines and to allow adjudicatory hearing processes to be completed where permits were challenged.

Most of the States which discussed the issue of delaying BAT, including Georgia, Idaho, Nebraska, Indiana, and Michigan, felt that some review of BPT effects and of the costs and benefits of going to BAT treatment levels were necessary before the more stringent limitations were implemented. The EPA is currently undertaking a thorough review of BAT guidelines as an integral part of its toxic pollutant control strategy. This strategy, which was announced after most of the State reports were prepared, was developed after it was realized that the previous method of controlling toxics, which consisted of establishing limitations on each toxic substance based on detailed studies of their effects, was too cumbersome to provide for effective control of the large number of toxic pollutants being discovered. The EPA now plans to use BAT technology-based effluent limitations to control the discharge of toxic pollutants. More stringent toxic controls would be used if technology-based standards are insufficient to protect human health or aquatic life.

The BAT approach to controlling toxics would provide each industry with defined treatment technologies for controlling pollutants. It would also allow the EPA to control large numbers of different toxic pollutants without having to develop detailed standards on each one, which would be a very lengthy process. Since the control of toxic substances is such a pressing issue, and since BAT provides an effective method for controlling toxics, delaying the implementation of BAT could have significant adverse effects on water quality. With the primary emphasis of BAT being on the control of toxics and not on more stringent control of traditional pollutants, and with thorough review of the economic impact of proposed BAT guidelines, the EPA does not foresee widespread economic impacts resulting from the implementation of those guidelines.

With regard to the goal of zero discharge of pollutants by 1985, all of the States which discussed it, including Indiana, Michigan, and Nevada believed that it was unreasonable and unattainable under present technology and economic conditions.

Nonpoint Sources

In their 1975 reports, many States pointed to the need for greater emphasis on determining more accurately the amounts, causes, effects, and control of nonpoint sources. The 1976 reports indicate that this need still exists, although most States did provide some additional information on nonpoint sources. Idaho devoted almost its entire report to a discussion of these problems, since most of its water quality problems are attributable to agricultural, silvicultural, and mining activities.

The information provided on the causes and effects of nonpoint sources is summarized in Chapter I in the discussions on the different types of water quality problems. As was noted there and in the 1975 report, nonpoint source effects are widespread, and their severity is dependent on a large variety of factors including climate, soil characteristics, land use patterns, and the extent to which control measures are being applied.

Quite a number of States have provided some information on the estimated magnitudes of nonpoint source loadings for various pollutants. The National Commission on Water Quality report also contained some estimates of the relative magnitude of point source and nonpoint source loadings for a few parameters. These reports indicate that nonpoint sources contribute significantly greater loadings of some parameters, especially suspended solids, than do point sources. However, this type of data should not be the sole criteria for assessing the relative impacts of nonpoint and point sources. The State of Florida, while recognizing the importance of nonpoint source problems, points out the following with regard to its own nonpoint source loading estimates:

> "Nonpoint sources, in contrast to point sources, are generally diffuse and may be more readily assimilated by the receiving waters than the more concentrated point source loads. In addition, nonpoint loads are generally released as pulse loads during rainfall events and any associated violations of water quality standards may be of an intermittent rather than continuing nature. Hence, while estimates of total non-point pollution

loads are necessary to support the evaluation of water quality problems, more thorough analysis will be necessary to determine the relative contributions of point and nonpoint loads to specific problem areas."

The potential beneficial effects of erosion control programs on agricultural lands were described in Chapter I. Other programs designed to control problems from mining and silvicultural activities are described in several State reports including Pennsylvania, Illinois, West Virginia, and Idaho (mining), and Vermont, Virginia, Oregon and Washington (silviculture). Several of these programs have already produced significant improvements in water quality.

Water Quality Success Stories — Some Results of the Control Programs

The implementation of water pollution programs on the Federal, State, and local levels has led to significant improvements in water quality in many areas across the country. Presented below are brief descriptions of how pollution control actions have restored water quality and beneficial water uses in 17 areas representing all sections of the nation. These success stories are a sample of the ones that have been noted recently. As the programs called for in PL 92-500 become fully implemented, it is expected that many more areas will be able to report improvements such as the ones described below.

Naugatuck River, Connecticut

The Naugatuck River is a tributary to the Housatonic River in western Connecticut. Historically, its water quality has been poor throughout much of its length due to discharges of untreated or inadequately treated municipal and industrial wastes.

By the 1950's, a stretch of the river below Torrington was so polluted that according to state biologists no living organisms could survive.

Installation of wastewater treatment equipment by industrial dischargers and upgrading of municipal sewage treatment facilities have significantly improved the river's water quality. Although much progress is still needed before the Naugatuck River can continuously meet its fishable/swimmable standards, fish and other aquatic life have returned to the same stretches that could support no life in the 1950's. A fish sample taken during the summer of 1975 revealed that smallmouth bass, bluegills, bullheads, and other fish were living in one stretch of the river.

Pemigewasset River, New Hampshire

A 55-mile stretch of the Pemigewasset River in the Merrimack River Basin, which had previously been described as being in a nuisance condition, has improved to the point where the water quality is suitable for canoeing, fishing, and swimming.

This improvement is attributed to the combined effect of six upgraded municipal treatment plans located in the area and to proper operation of a large industrial wastewater treatment plant.

This improved water quality has contributed greatly to the growth of the summer tourist industry in the Pemigewasset Basin. Campgrounds featuring swimming and boating have combined with skiing facilities to make this a year-round resort area.

Mohawk River, New York

The Mohawk River flows through the populous and heavily industrialized Utica-Rome area, then flows eastward to the Hudson River.

Before 1972, Utica-Rome and other areas were discharging raw waste into the river causing a near-continuous violation of the total coliform bacteria standard and low dissolved oxygen levels.

Today the river is getting progressively cleaner due to the State of New York's Pure Waters Program and to abatement efforts by local communities and the EPA. More than 75 percent of the industrial wastes discharged into the river are now being treated, and the remainder are expected to receive adequate treatment within a few years.

As a result of these improvements there have been fewer total coliform bacteria violations and the dissolved oxygen content is approaching 100 percent of saturation. Fish samples, taken recently by State biologists in the Mohawk River near Albany included pollution-sensitive fish such as bass, walleye, perch, and sunfish. It is expected that these sport fish will increase in numbers as the river's water quality continues to improve.

Monongahela River, West Virginia and Pennsylvania

The 128-mile-long Monongahela River begins at Fairmont, West Virginia, then flows north to join the Allegheny River at Pittsburgh to form the Ohio River.

During the nineteenth century the Monongahela River supported a large and profitable fisheries industry. An aquatic study conducted in 1886 identified 40 species of fish in the river near the Pennsylvania-West Virginia border, including many pollution-sensitive fish. But during the first half of the twentieth century, water quality degradation caused by acid mine drainage in the 87-mile long upper river from Fairmont, West Virginia to Charleroi, Pennsylvania, and heavy industrial development in the 41 mile stretch above Pittsburgh killed virtually all the fish in the Monongahela.

By the late 1960's, state water pollution control agencies in Pennsylvania and West Virginia stepped up enforcement of treatment requirements at mining sites. This treatment involved neutralizing acid waste to a safe level for aquatic life.

A study conducted in 1969 and 1970 showed a great improvement in the fish population in the upper Monongahela River. As a result of this finding, the Pennsylvania Fish Commission began stocking sport fish in the Upper Monongahela.

Although there is still a great deal of work to be done to clean up industrial discharges from steel making plants along the lower Monongahela River, the river's overall water quality has improved significantly.

French Broad River, North Carolina

The French Broad River located in western North Carolina suffered from extreme water quality degradation in the 1950's. The dissolved oxygen level in the reach of the river between Pisgah Forest and Asheville dropped to nearly zero. This low dissolved oxygen level caused severe stress on the living organisms in the river and the fish population was reduced drastically.

The majority of the pollution load to the river came from discharges from the Olin Corporation, the American Enka Corporation, and the City of Asheville. These discharges contained high biochemical oxygen demand, high total suspended solids content, and heavy metals. The color of the water in this reach of the river had become black, and the river was foam-covered and malodorous.

Water quality improvements in this area started after both industries constructed waste treatment facilities. The American Enka Company also made a complete change in its production process to reduce the heavy metals it was discharging into the river.

As a result of these abatement activities, the black color of the water, the foul odor, and foaming conditions have disappeared. The dissolved oxygen level has reached 60 to 70 percent of saturation, enabling fish to reappear. While much abatement work still remains, improvements in water quality in the French Broad River are expected to continue.

Savannah River, Georgia and South Carolina

The Savannah River is one of the principal interstate streams of the southeastern United States. Although the river is 310 miles long, only the lower 22 miles, mostly along the Georgia side, is heavily urbanized and industrialized.

Due to citizen complaints, in 1963 the U.S. Department of Health, Education and Welfare (HEW) conducted a study of the lower 22-mile stretch.

The HEW study found that the combination of industrial and municipal waste had severely polluted the lower Savannah River. Sewage from an area containing about 146,000 people was being discharged into the river. Four-fifths of these discharges were raw sewage.

In addition, industries were discharging process wastes, cooling water, and chemical wastes including oxygen-demanding materials estimated to be equivalent to those in raw sewage from a sewered population of approximately 1,000,000.

Because of the heavy pollution load, the dissolved oxygen content in the reach was consistently low. This low dissolved oxygen content, in combination with industrial waste, adversely affected aquatic life. Approximately 11,000 acres of coastal waters were closed to shellfishing and the sale of commercial fish decreased.

Since then, the State of Georgia and the EPA have worked together to clean up the lower Savannah River. According to Georgia's 1975 "Water Quality Report," all major dischargers have constructed waste treatment facilities.

The effect of these updated facilities on the river has resulted in a cleaner and more productive waterway. The number and diversity of aquatic life has increased and fish are reappearing in parts of the river where they have not been found in years.

Lower Tombigbee River, Alabama

A five-mile stretch of the Lower Tombigbee River near McIntosh, Alabama was once known as "the fish kill capital of Alabama."

Water quality degradation and fish kills in this area were caused by a local industry which, prior to 1974, discharged wastewater containing pesticides and other organics. During this period there were no young bass in the river up to five miles below McIntosh.

In 1971, the State of Alabama initiated legal action against the industry. Shortly after, the industry started providing for the required treatment of its wastes. The waste-water is now completely detoxified and over 85 percent of the organic chemicals are removed.

Due to these improvements, the river now meets the State of Alabama's water quality standards for fish and wildlife. In addition, young bass have reappeared in the five-mile stretch below McIntosh. No serious fish kills have been reported recently.

Pearl River, Mississippi

Not too long ago, the Pearl River downstream of Jackson, Mississippi was one of the State's most polluted waterways. The river received inadequately treated and raw sewage from Jackson-Hinds and Rankin Counties. This raw sewage accounted for approximately 50 percent of the total volume from the Jackson-Hinds county area. As a result, the river between Jackson and Byron, Mississippi was often odorous and had zero dissolved oxygen. The predominant biological species in this stretch of the river was bloodworms, indicators of gross pollution. Pollution conditions became so severe that even the bloodworm population disappeared.

In 1975, a new municipal wastewater treatment plant and interceptor system were completed. The new plant presently treats all of the wastewater from the Jackson-Hinds county area with an 85-90 percent reduction of BOD, COD, and suspended solids.

These improvements are significant. The floating organic debris and associated odors are already gone, and state pollution control experts expect rapid improvement in the dissolved oxygen content and a reduction of fecal coliform bacteria.

Salt Creek and Trail Creek, Indiana

In spite of their poor water quality over the years, the Indiana Department of Natural Resources selected Salt Creek and Trail Creek as salmonid rearing and implanting areas.

In the fall of 1972, substantial fish kills occurred in Salt Creek and Trail Creek when chinook salmon attempted to migrate up both creeks from Lake Michigan. Because of these fish kills, the Indiana Stream Pollution Control Board conducted an investigation. The Board found that discharges from municipal wastewater treatment plants caused a low dissolved oxygen content and a high ammonia concentration which did not allow the passage of migrating fish.

By altering treatment techniques and using chemical additives, the municipalities reduced the ammonia being discharged and improved the dissolved oxygen content. While water quality improvement in Salt Creek and Trail Creek has not been quantified, fishing has improved significantly and no fish kills have been reported since the additional treatment started.

Detroit River, Michigan

The Detroit River is a fast southward flowing river that connects Lake St. Clair with Lake Erie. In the late 1800's the river was in excellent condition, but by the 1950's it was considered by many to be a dead river.

The river had become a dumping ground for sewage, chemicals, waste oils, acid, garbage, paper sludge, and trash. The shoreline was covered with a quarter-inch film of oil and grease balls 8 to 10 inches across were washing up to the shore. Tons of phosphorus that eventually reached Lake Erie were discharged daily into the river over the years. Detroit's major tributary, the Rouge River, flowed an orange color from the discharge of pickle liquor, an acid used to process steel. By January of 1948 the Detroit River was so polluted with oil that 20,000 ducks were killed when they landed in openings in the ice. Massive duck kills continued into the late 1950's and early 1960's. In addition to the duck kills, aquatic life was reduced drastically.

Control programs for the Detroit area municipalities and industries, initiated in 1965, started water quality improvements. A State water engineer estimated that the waste oil and grease entering the river were reduced 82 percent between 1963 and 1975.

Today, fishermen are catching walleyes, pike, muskellunge, smallmouth bass, coho salmon, perch, sturgeon, and brown trout in the river. There has not been a major duck kill since 1968 and the once oil-covered shoreline is almost clean.

The most dramatic water quality improvement has been in the Rouge River. One major industry along its shore has cut its iron discharges by 91 percent and its oil and grease by 73 percent. The color of the Rouge River is also returning to normal.

Arkansas River, Arkansas

For many years, the Arkansas River was a dumping ground for municipal and industrial wastes. Accumulations of silt and salt, aggravated and increased by man's activities, also contributed to the river's water quality degradation. In 1955, the Arkansas-White-Red Basin Interagency Committee reported that the river had been abandoned for any beneficial uses and was only suitable for transporting waste.

Since then several factors have led to greatly improved conditions in the Arkansas River. The McClellan-Kerr Arkansas River Navigation project provided bank stabilization to reduce sediment runoff and flow augmentation to increase the river's assimilative capacity during low-flow periods. New sewage treatment plants were constructed, and older ones were upgraded. As sewage contamination was being reduced by new munipal wastewater treatment plants, industrial dischargers also upgraded treatment facilities to improve the water quality.

Water quality improvement in the Arkansas River can be attributed to the cooperative efforts of Federal, State, and local agencies, to municipalities and industries along the river, and to the desire of local citizens to improve the water quality of this important waterway.

Today, the Arkansas River is relatively clean. The water on the river is now suitable for uses such as public and industrial water supply, fishing, wildlife propagation, and agriculture. Much of the river, including a 50-mile reach upstream of Little Rock, is clean enough to allow primary contact recreation.

Center Creek, Missouri

Center Creek, which flows through the Joplin area of southwestern Missouri, suffered from poor water quality during the 1950's and early 1960's because of wastewaters discharged from fertilizer and explosives manufacturers into Grove Creek, a small tributary.

In 1965, relatively few bottom organisms could be found in the six to eight miles of Center Creek below the confluence with Grove Creek.

Starting in 1967, after the adoption of water quality standards, the industries along Grove Creek began construction of pollution control facilities. As a result, the amounts of dissolved fluoride, phosphorus, ammonia, and nitrate nitrogen in the water have been greatly reduced.

Biological data from a 1974 survey showed indications of a remarkable improvement of water quality in Center Creek below the confluence of Grove Creek. Pollution-sensitive organisms such as mayflies and stoneflies were common. This section of the creek now meets water quality standards for both fishing and primary contact recreation.

Red River of the North, North Dakota

The Red River of the North flows toward Canada along the border of North Dakota and

Minnesota, then finally empties into Canada's Lake Winnepeg.

A study conducted in 1964 reported that no game fish were found in a seventeen mile stretch of the river below Fargo, North Dakota and Moorhead, Minnesota. The combined wastes from treatment facilities in these cities and from sugar beet and potato processing plants had eliminated all pollution-sensitive aquatic life in that river stretch.

The effluent from these discharges contained high levels of nutrients which stimulated algal growths and bacterial slimes. Huge amounts of decaying matter consumed the dissolved oxygen in the water, which resulted in a zero dissolved oxygen concentration at the Grand Forks intake in 1965.

A Federal/State enforcement conference was held in 1965 to develop specific actions aimed at improving the Red River. This was later given legal backing by passage of the 1972 Amendments to the Federal Water Pollution Control Act.

Due to these actions, the potato and sugar beet processors improved or eliminated discharges, and the municipalities no longer discharged raw waste into the river.

By the mid-1970's, the water quality of the Red River had improved on the order of 60 to 65 percent in terms of dissolved oxygen and fecal coliform bacteria. In addition, it was reported that game fish are back in the river and are expected to increase in large numbers.

Boise River, Idaho

During the 1960's and early 1970's the J.R. Simplot Company, a food processor located in Caldwell, discharged wastewater containing high concentrations of biochemical oxygen demanding substances, suspended solids, and nutrients into the Boise River.

These wastes caused sludge banks, excessive aquatic growths, and low dissolved oxygen levels in the Boise River. The nutrient load also contributed to algal growth problems in Brownlee and other downstream reservoirs on the Snake River.

In 1974, the company eliminated the wastewater discharge into the Boise River by utilizing a combination primary treatment and spray irrigation system.

Significant improvements have resulted from this treatment. A study by the U.S. Conservation Service and Agricultural Research Service indicated that virtually all of the BOD and suspended solids previously entering the river have been eliminated. The treatment and irrigation system has also all but eliminated the nitrogen and phosphorus that caused eutrophication problems downstream.

The previously deposited sludge banks are now disappearing and dissolved oxygen concentrations are increasing.

Middle Chehalis River, Washington

Before 1970, the Chehalis River near Centralia/Chehalis was seriously degraded. Low dissolved oxygen levels impaired upstream migration of salmon, and high bacteria levels prevented recreational uses of the river. These problems were caused primarily by domestic and industrial waste discharges from the Chehalis wastewater treatment plant. They were also aggravated by the naturally slow flow in this part of the Chehalis, which increased algal bloom potential, elevated water temperatures, and reduced dissolved oxygen concentrations.

The upgrading of the Chehalis Wastewater Treatment Plant to secondary treatment in late 1969 dramatically improved water quality in this river stretch. The river now meets Class A water standards, which allow for uses such as potable water supply, fishing, swimming, and fish and shellfish reproduction and rearing.

Pearl Harbor, Hawaii

Pearl Harbor on the Island of Oahu is one of the finest natural harbors in the Pacific Ocean. It covers over 9 square miles of surface area consisting of three locks or embankments.

Since World War II, Pearl Harbor has been closed to the public for security reasons and because of excessive pollution. Studies done in 1969 showed that more than four million gallons per day (mgd) of raw sewage and over three mgd of primary treated sewage were being discharged to the Harbor by the Navy and by neighboring municipalities. Oyster beds had been severely contaminated by human sewage. In addition, the city and county of Honolulu operated an open, burning dump on the West Lock which contributed debris and leachate pollution as well as smoke and odors.

In response to an Executive Order in 1970 which required Federal facilities to meet environmental standards, the Navy moved quickly to control its discharges and worked with the Army and Air Force to construct a joint sewage treatment plant which was completed in 1971. The plant has helped to greatly reduce sewage contamination, and other new facilities are being constructed.

Today, there are no raw sewage discharges into the Harbor, and the open burning dump has been closed. Due to these improvements the Navy has extended access of Pearl Harbor to the public for swimming, boating, and fishing.

Kodiak Harbor and Gibson Cove, Alaska

The city of Kodiak and Gibson Cove are the hub of Alaska's seafood industry. In 1971, 15 seafood processing plants were operating in these areas. According to plant records, these plants discharged an estimated 72 million pounds of untreated wastes into the waters of Kodiak Harbor and Gibson Cove. These waters accumulated over the years and seriously degraded the water quality. The decomposing sludge gave off noxious hydrogen sulfide gas. Dissolved oxygen levels in 1971 were well below the level necessary to support a healthy biological community, and floating solid waste produced a severe aesthetic degradation.

To alleviate these problems the EPA issued permits in 1973 requiring that the amount of solid wastes discharged to Kodiak Harbor and Gibson Cove be substantially reduced. The seafood processing plants subsequently installed small mesh screens to collect solid wastes flowing out of their facilities.

A recent study showed certain improvements in water quality, most notably in the amount of sludge and hydrogen sulfide gas in the sludge deposits on the bottom of Kodiak Harbor and the adjacent Gibson Cove. Improvements were found in the dissolved oxygen level, and the hydrogen sulfide odors were not as apparent as they were prior to the installation of the screens, thus making the harbor and cove more suitable for aquatic life.

CHAPTER III

COSTS OF MEETING THE GOALS OF THE ACT

The 1976 State reports do not provide much new information for assessing costs associated with meeting the 1983 goals of PL 92-500, primarily because these reports were prepared before the results of the 1976 Needs Survey of municipal construction costs became available. Since then, the new Needs Survey has been published and is summarized in this chapter. A total of 16 States have provided estimates of industrial control costs. In addition, the National Commission on Water Quality and the Council on Environmental Quality have provided national compilations of water pollution control costs.

Municipal Costs

The 1976 *Needs Survey* total estimates are considerably lower than estimates provided in the 1974 *Needs Survey* and by the National Commission on Water Quality, especially for the correction of combined sewer overflows and the control of stormwater runoff (Table III-1). The principal reasons for this reduction were the availability of more comprehensive facility planning information and the application of uniform design conditions and reporting criteria. In addition, the effects of construction grants which have been awarded to date are also noticeable in the reduced estimates for the secondary treatment and interceptor sewer categories.

The Council on Environmental Quality did not estimate actual needs but instead projected future federal obligations under the municipal grants program. Using this method, the Council estimated that the total capital investment would be $45.9 billion for all categories over the next ten years.

Industrial Costs

A total of 16 States have provided estimates of Statewide capital costs to meet the industrial effluent limitations required under PL 92-500 (Table III-2). These States are responsible for 54 percent of the total national value added by manufacturing, according to the 1972 *City and County Data Book*. Therefore, as a rough approximation, one could estimate that they would account for 54 percent of the total national industrial water pollution control expenditures. Using this assumption and the fact that the total estimated costs for these 16 States was $12.5 billion, the estimate for total national industrial expenditures for water pollution control is $23 billion.

The National Commission report estimates that the costs for meeting BPT requirements alone will be $37 billion. BAT requirements and New Source Performance Standards will cost an additional $23 billion and $20 billion respectively, for a total cost to industry of $80 billion.

The Council on Environmental Quality report also presented an estimate of total projected industrial pollution control costs. This estimate, which came to $40.3 billion, included BAT level treatment for most industries. The Council states that this figure is the maximum amount that it expects to be spent to meet EPA guidelines.

Direct comparisons between the State estimates and the National Commission and CEQ estimates are difficult for several reasons. First, the 16 States which did provide estimates may not be a representative sample of the different industries which will need to spend substantial amounts on pollution control. Second, about half the States based their estimates on BPT requirements while the other half used BAT requirements (Table III-2). Third, some States did not include very small discharges or thermal discharges in their estimates.

Despite these difficulties, the State estimates do appear to be considerably lower than both the CEQ estimate and even the BPT treatment level estimate of the National Commission. One possible explanation for this difference is that estimates of the type developed by the National Commission generally assume industry-wide end-of-pipe treatment as specified in the EPA's effluent guideline development documents. In practice, many plants may be able to avoid installation of expensive treatment facilities by employing more efficient water usage, by instituting process changes, or by land application of wastes

TABLE III-1

COST ESTIMATES FOR MUNICIPAL FACILITIES CONSTRUCTION
(billions of January, 1976 dollars)

Category	1976 Needs Survey		1974 Needs Survey		NCWQ
	EPA	State	EPA	State	
I. Secondary treatment	12.96	13.20	17.81	17.81	11.88
II. More advanced treatment required by water quality standards	21.28	22.05	22.24	28.24	27.28
III A. Correction of sewer infiltration/inflow	3.02	3.77	7.42	7.53	7.59
III B. Major sewer rehabilitation	5.49	5.73	10.25	10.25	10.45
IV A. Collector sewers	16.98	17.79	24.58	34.50	14.30
IV B. Interceptor sewers	17.92	18.53	25.27	28.11	14.85
V. Correction of combined sewer overflow	18.26	19.34	43.51	43.62	87.56
Total (I–V)	95.90	100.42	151.08	170.57	173.91
VI. Control of stormwater	54.13	57.25	329.00	329.00	174.47
Total	150.04	157.67	480.08	499.57	348.38

NOTE: Totals may not sum due to rounding.

where land is available. Another possible explanation is that, in many States, a large part of the required facilities are already in place. The State estimates, which are generally based on surveys and other techniques using local information, would be able to detect these factors whereas national industry-wide estimates would not.

TABLE III-2

STATE COST ESTIMATES FOR INDUSTRIAL POLLUTION CONTROL
(millions of dollars)

State	Treatment Level BPT	Treatment Level BAT
Delaware		100
Georgia		300
Illinois	1,200	
Indiana	1,136	
Kansas		158
Michigan	1,200	
Minnesota		700
Mississippi		422
Nebraska	243	
New York		1,000
North Carolina		353
Ohio	386	
Tennessee		1,567
Texas		3,315
Virginia	100	
Wisconsin	324	

CHAPTER IV

GREAT LAKES WATER QUALITY

Water quality of the Great Lakes, which collectively contain one-fifth of the entire world's supply of fresh water, has been of concern for many years. Congress recognized the special water quality needs and importance of the Great Lakes; Section104(f) of PL 92-500 authorized special research and technical development work, and Section108 authorized special demonstration programs and specific studies in an effort to focus further attention on the Great Lakes as an important national as well as international water resource.

The Great Lakes Water Quality Agreement between the United States and Canada was signed on April 15, 1972. The intent of this agreement is to restore and enhance the water quality in the Great Lakes system. The adoption of common water quality objectives is the first step toward improving the Great Lakes water quality.

States bordering the Great Lakes are also concerned about the Great Lakes waters within their State's boundary. However, individual State programs to prevent further water quality deterioration in the Great Lakes system have been focused primarily on improving water quality in the tributary streams and have not been adequate for the Great Lakes as whole. It is a purpose of the special provisions of PL 92-500 and the International Agreement to coordinate and assist the States in achieving water quality goals. With the addition and identification of new persistent toxic pollutants in the Great Lakes (Table IV-1) it is imperative that increased emphasis be placed on improving water quality.

Under the International Agreement of 1972 the International Joint Commission was assigned special responsibilities and functions. The Great Lakes Water Quality Board was established by the International Joint Commission to assist it in the exercise of assigned powers and responsibilities. Each year the Great Lakes Water Quality Board submits an annual report on Great Lakes water quality to the International Joint Commission. The Board's assessment of the Great Lakes water quality as well as other reports such as the sixth annual report of the Council on Environmental Quality, etc., are reflected in this report and together constitute the EPA's assessment of Great Lakes water quality.

TABLE IV-1

TOXIC POLLUTANTS WHOSE CONCENTRATIONS IN FISH TISSUES EXCEED U.S. FOOD AND DRUG ADMINISTRATION LIMITS

	Pollutant/FDA limit		
Lakes	PCB's/5 ppm (1)	Mercury/0.5 ppm	DDT/5 ppm
Lake Superior	x	x	x
Lake Michigan	x		x
Lake Huron			
Lake Erie		x	
Lake Ontario	x	x	

(1) parts per million.

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Lake Superior

The quality of the open waters of Lake Superior meets the water quality standards of the bordering states and the water quality objectives stated in the International Agreement. However, degraded conditions do exist in some nearshore areas as a result of point source discharges, tributary inflows and erosion. The major problem areas are Duluth-Superior Harbor, Silver Bay, and the portions of southern shore of the lake (Figure IV-1).

Duluth–Superior Harbor

State standards for dissolved oxygen, fecal coliform bacteria, phenols and copper are violated in Duluth-Superior Harbor. Levels of nutrients in the harbor are generally above levels necessary to develop algal blooms. The nearshore waters in the Duluth-Superior area are also high in coliform bacteria, phosphorus, suspended solids and turbidity.

The major pollution sources are the Duluth and Superior sewage treatment plants, a U.S. Steel plant, harbor traffic, and the St. Louis and Nemadji Rivers. By mid-1977, the nine sewage treatment plants in the Duluth area will be replaced by the Western Lake Superior sanitary District and the Superior sewage treatment plant will be completed. Both these plants will provide secondary treatment with phosphorus removal and should result in a significant improvement in water quality conditions.

However, bottom sludges in these polluted areas affect water quality and contribute to a low dissolved oxygen problem. These deposits will continue to have an impact on water quality for some time, even after point sources are abated.

Silver Bay

The major source of degradation in Lake Superior is asbestos fibers from taconite tailings of the Reserve Mining Company in Silver Bay. Asbestos is known to cause cancer when inhaled and poses a cancer risk when ingested. By the time absolute scientific proof is available the harm may be irreversible. Asbestos-like fibers were discovered in the drinking water of Duluth, Minnesota and nearby communities on Lake Superior's north shore in 1973.

The EPA, the States of Wisconsin, Michigan and Minnesota and several environmental organizations filed suit in the federal district court in an effort to end Reserve's discharge into Lake Superior. As of the time this report is being prepared, Reserve Mining has been ordered by the courts to close down its operation by July 1, 1977. In the meantime, the city of Duluth, with federal support, has taken steps toward installing a filtration system to remove the fibers from the drinking water.

Southern Shore

The red clay bluffs area along portions of the southern shore of Lake Superior is characterized by increased suspended solids and turbidity from natural shoreline erosion and tributaries which flow through the red clay deposits. Control of the problem is being addressed through the development of land management schemes and ongoing erosion control programs involving precautionary cultivation and construction practices.

Other Problems - PCB's, Mercury, Pesticides

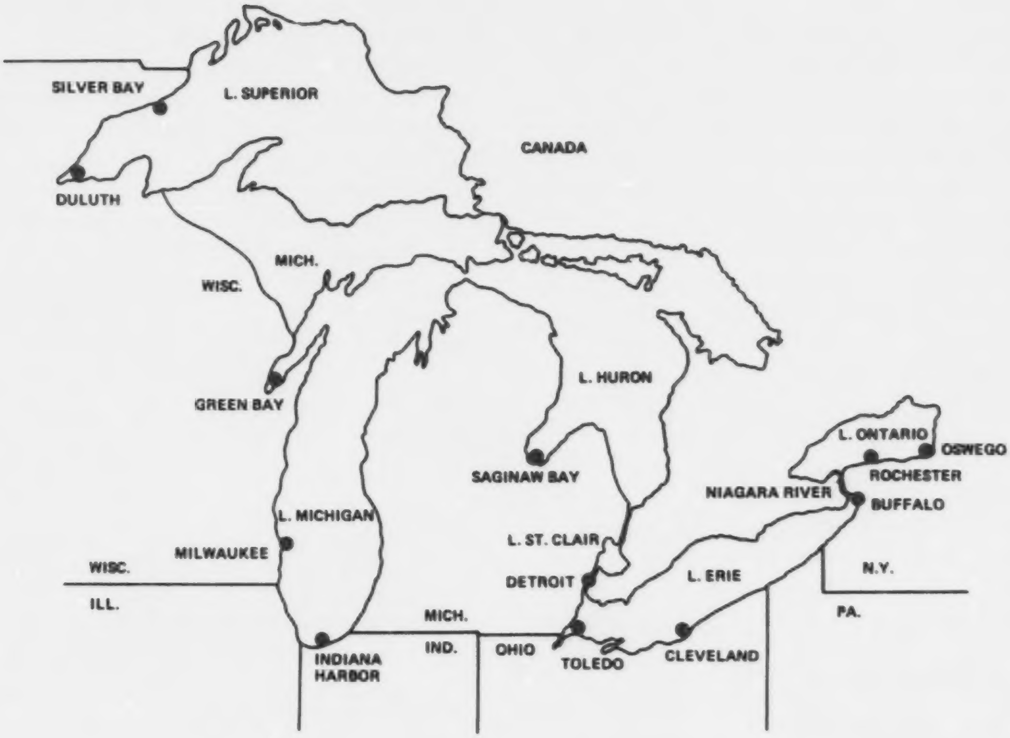
In addition to these specific, localized problems, there are other areas where concentrations of PCB's, mercury, and pesticides in fish approach or exceed recommended levels.

Concentrations of PCB's, DDT and mercury exceed the U.S. Food and Drug Administration's limits (5.0, 4.0 and 0.5 ppm, respectively) in the fat variety of Lake Superior lake trout. Concentrations of PCB's, DDT and mercury average 14.3, 8.4 and 0.68 ppm, respectively, in these fat trout. The maximum PCB concentration found in fat lake trout was 61.5 ppm.

Lake Superior lean lake trout generally do not exceed the FDA guidelines. Concentrations of PCB's, DDT and mercury averaged 1.68, 0.94 and 0.23 ppm, respectively. The maximum PCB concentration in lean lake trout was 8.6 ppm.

There is no indication yet of a downward trend in PCB concentrations in Lake Superior lake trout. Because PCB accumulation in fish and aquatic invertebrates could reach levels hundreds of thousands of times higher than that in ambient water, EPA has established water quality criteria of 0.001 parts per billion (ppb) for PCB levels in lakes and streams.

FIGURE IV-1
MAJOR PROBLEM AREAS AROUND THE GREAT LAKES
(U.S. WATERS)


SILVER BAY
L. SUPERIOR
CANADA
DULUTH
MICH.
WISC.
GREEN BAY
L. HURON
L. ONTARIO
OSWEGO
ROCHESTER
SAGINAW BAY
NIAGARA RIVER
BUFFALO
L. MICHIGAN
L. ST. CLAIR
MILWAUKEE
WISC.
ILL.
DETROIT
L. ERIE
N.Y.
MICH.
IND.
PA.
OHIO
TOLEDO
CLEVELAND
INDIANA HARBOR

Elevated levels of heavy metals such as zinc, lead and nickel have been found in harbor and certain inshore area sediments of Lake Superior.

Lake Michigan

Lake Michigan open waters are generally of high quality displaying only minor situations where water quality fails to meet the standards of the bordering States or the objectives of the International Agreement. Three areas which have been identified as having significant water problems are Milwaukee Harbor, Green Bay, and the Indiana Harbor Ship Canal (Figure IV-1).

Milwaukee Harbor

The Milwaukee Harbor area is characterized by high coliform bacteria, BOD, low dissolved oxygen, and high suspended solids from stormwater and combined sewer overflows. A study is underway for deep tunnel storage and treatment of combined sewage. There is also an ongoing demonstration project for treating overflows by chemical coagulation and activated carbon. Interceptor sewers have been constructed.

Green Bay

Lower Green Bay has been identified as a polluted area being influenced by the highly industrialized and populous Fox River Valley. Dissolved oxygen levels have been low over the past thirty years. During warm weather, critical dissolved oxygen conditions are common in the Fox River, and extend into Green Bay, a distance of 3 to 5 kilometers (2 to 3 miles). During cold weather, particularly under ice cover, low dissolved oxygen conditions extend about 50 km (30 miles) into the Bay. Phosphorus concentrations are high in the Bay and in the vicinity of the Fox River mouth, and large areas of sewage sludge are found in the bottom sediments. Total phosphorus limits occasionally exceed the

1.0 mg/1 standard for the bay in spite of the new phosphorus removal facilities. PCB concentrations in carp and white fish in the Bay exceed the 5 ppm FDA limit for PCB's. Taste and odor problems have been experienced in public water supplies from Green Bay.

All major municipalities in the Fox River Valley have adequate treatment or a remedial program under construction. The latest scheduled completion date is July 1977 for the City of Fond Du Lac. Programs are underway in most of the major municipalities to separate sewer systems and control storm water overflows.

Nine of the 12 papermills located in the Fox River Valley are in compliance with National Pollutant Discharge Elimination System (NPDES) permit schedules. The Consolidated Paper Company treatment system failed to attain operational level, and the case was referred to the Attorney General for resolution. The Fort Howard Paper Company permit is pending an adjudicatory hearing and the Appleton Paper Company's permit is being modified. When these three companies meet their compliance schedules, water quality in the Fox River and Green Bay is expected to improve.

Indiana Harbor Ship Canal

The Indiana Harbor Ship Canal is the main source of pollution in the Calumet area of Lake Michigan. It carries effluents from two municipal treatment plants, East Chicago and Gary, and the industrial discharges from Atlantic Richfield, E.I. DuPont, Inland Steel, United States Steel and Youngstown Sheet and Tube. The most noticeable pollutants are ammonia, phenols, oil and grease, zinc, mercury, cyanide and phosphorus. The municipalities presently are implementing programs for phosphorus removal and some decreases in phosphorus levels have been noted. Improvements in the quality of industrial effluents have also been noted, and further improvements are expected as final discharge permit limitations are achieved. However, the canal itself will continue to have problems until the sludge deposits on the bottom dissipate or are removed.

Other Problems–PCB's, Pesticides

In addition to these problems, PCB and pesticide residues in Lake Michigan fish were found to exceed safe levels. Current data for 1974–1975 indicate that PCB concentrations in Lake Michigan coho salmon, lake trout, and chubs exceed the FDA limit. These concentrations have not decreased since 1972, despite recent reductions in the use of PCB's.

Dieldrin residues in Lake Michigan fish have regularly averaged just below the FDA limit of 0.3 ppm. There has not been a significant decline since the 1960's.

DDT contamination in several Lake Michigan species was especially severe in the mid-1960's and exceeded the FDA limit of 5 ppm. A 1969 ban on DDT use in part of the Lake Michigan watershed, including Indiana, Michigan and Wisconsin, led to a signifcant decline of DDT residues in the lake by 1972. Only in large lake trout of Lake Michigan are DDT residues above FDA limits.

Lake Huron

The open waters of Lake Huron are of good quality and meet state standards and the International Agreement objectives. On the U.S. side, the one major problem area is Saginaw Bay (Figure IV-1). Problems in Saginaw Bay include enrichment from excessive nutrients resulting in high phytoplankton levels, the presence of PCB's and other organic compounds in fish, polluted sediments, taste and odor in water supplies, excess coliform bacteria, high dissolved solids concentrations, and periodic fouling of beaches with dead alewives and *Cladophora* fibers.

The major municipal dischargers contributing to these problems include Saginaw, Bay City, Milwaukee, Essexville, and Midland which are in compliance with interim NPDES discharge permit requirements and are currently providing 80 percent phosphorus removal. Sewer construction is underway in Saginaw and Bay City to remedy some of the pollution problems. Facilities under construction at the City of Flint will provide tertiary treatment and phosphorus removal by March 1977.

The most significant dischargers of dissolved solids and chlorides, Dow Chemical in Midland and Michigan Chemical Company in St. Louis, Michigan are scheduled to be in compliance with NPDES discharge permit requirements by January 1977. A 50-percent improvement in chloride concentration since 1965 has already been noted. Decreases were noted in the major ions calcium, magnesium, sodium and potassium.

Elimination of known PCB sources has led to rapid reduction of PCB residues in fish in the Saginaw River. In 1971-72, the Saginaw River had the highest PCB concentrations of any Great Lake tributary within Michigan boundaries. The average concentration in the water was 1.1 ppb (the EPA criteria is .001 ppb). Concentrations as high as 169 ppm were recorded in the fish. By August 1973, concentrations in all species tested were below 5 ppm.

Elevated levels of heavy metals such as zinc, lead, and nickel have been found in harbor and inshore area sediments of Lake Huron.

Lake Erie

Lake Erie water quality has been the object of great concern for both the general public and scientific investigators for the past decade. This has resulted in water quality studies by a large number of agencies.

These data show that, on the whole, conditions appear to be improving compared to the recent past when widespread problems were observed. Despite these improvements, which include reductions in taste and odor problems at water supply intakes (attributed to phosphorus controls leading to decreased phytoplankton production), a total of 24 problem areas have been identified by the Great Lakes Water Quality Board. The most significant problems are the Detroit River, nearshore areas at Toledo, the Cleveland Harbor area, and the open waters of the lake, where excessive nutrients have caused severe eutrophication problems (Figure IV-1). The remaining areas are generally located at the mouths of tributaries such as the Black, Sandusky, Grant, and Ashtabula Rivers in Ohio. These tributaries in Ohio have been identified as major sources of inputs of fecal coliform bacteria, phosphorus, metals, suspended and dissolved solids, oil and grease, and other pollutants. The extent of their impact on the lake is not known as there is no near-shore surveillance program in these areas.

Detroit River

The Great Lakes Water Quality Board reports that there has been a major effort to control water pollution along the Detroit River during the last ten years. Great improvements have been made, particularly in reducing oil and steel mill pickle liquor entering the river. However, the near shore areas still have water quality problems which persist because of the intense industrial and commercial activity along the shore, the major municipal sewage treatment plants, and combined sewer overflows.

The Board's comparison of 1975 water quality with that of previous years shows a significant improvement in pH and dissolved oxygen, and the international agreement's water quality objectives for these parameters are now being met. Problems with high coliform bacteria and iron concentrations still remain. A new analytical procedure for phenol which gives improved sensitivity to low concentrations was adopted in early 1975. As a result, phenol was detected throughout the river.

The Board found significant reductions in pollutant loadings being transported to Lake Erie by the Detroit River, its largest tributary. Chloride loadings have decreased more than 20 percent since 1968. The total phosphorus load has decreased by more than 60 percent since 1968, although 1975 river measurements showed a slight increase over 1974. Remedial measures currently underway should further reduce the total phosphorus loading. The only parameter which has shown a definite upward trend in recent years is nitrate, which has more than doubled since 1968.

The largest municipal sewage treatment plant in the area--indeed, the largest single source of treated wastewater in the Great Lakes Basin--is the City of Detroit Plant. This plant serves more than 3 million people. Upgrading the Detroit Wastewater Treatment Plant to provide secondary treatment and phosphorus removal is currently underway. Significant reductions in the phosphorus and phenol loadings will result as this facility is completed and fully utilized.

Construction of the Wayne County-Wyandotte Wastewater Treatment Plant has recently been completed with the addition of secondary treatment and phosphorus removal. These facilities will also significantly reduce the discharges of phosophorus and phenol to the Detroit River.

Approximately 80 combined sewer overflows exist along the Rouge and Detroit Rivers and contribute to the high concentration of coliform organisms, phosphorus, ammonia, and chlorides found in the river. Studies on the combined sewer overflow problem have been initiated and, coupled with the regional planning underway, should provide data on the problem and suggest remedial actions.

Toledo Area

The Toledo area has water quality problems at the mouth of the Maumee River attributed to low dissolved oxygen, high fecal coliform counts and high phosphorus concentrations.

Cleveland Area

Water quality in Cleveland Harbor is degraded by the Cuyahoga River. Problems exist with low dissolved oxygen, high concentrations of ammonia, dissolved solids, zinc, copper, phenols and cyanide and elevated temperatures.

Numerous municipal and industrial sources contribute to this problem area. The last eleven miles of the Cuyahoga, from the Cleveland Southerly Sewage Treatment Plant to the mouth, are polluted to such a degree that general water quality standards cannot be attained with the implementation of the best practicable treatment levels by all dischargers.

Downstream from the Cleveland Southerly Sewage Treatment Plant discharge, during critical low flow periods, the Cuyahoga River remains in violation of the dissolved oxygen, ammonia and dissolved solids water quality standards of the State of Ohio. The problems encountered in this area are caused by the numerous sanitary sewer overflows, industrial dischargers, and the Cleveland Southerly Sewage Treatment Plant effluent. The total pollutant loadings discharged to this last segment of the Cuyahoga River are much too high for the river to assimilate and the flow characteristics of this area magnify the problem. As the river approaches Lake Erie its velocity is reduced, creating an extensive settling basin which must be dredged frequently to maintain a proper depth in the navigation channel.

Other Problems–Phosphorus, Dissolved Oxygen, Mercury

In the western basin of Lake Erie, increases were apparent in both chlorophyll and total phosphorus concentrations. The increases observed in total phosphorus in the western and central basin are believed due to increased resuspension of sediments.

In the eastern basin no apparent changes in levels of chlorophyll $\underline{a}$, total phosphorus, or dissolved oxygen were apparent. Low dissolved oxygen levels have historically been a problem in Lake Erie, especially in the central basin.

Commercial fishing in Lake St. Clair and for walleye in the west basin of Lake Erie has been banned since 1970 due to mercury contamination. Shortly after 1970, mercury was found to exceed the FDA limit of 0.5 ppm in at least one species of fish from each of the Great Lakes except Lake Michigan. Mercury residues in Lake St. Clair fish have declined steadily since curtailment of industrial discharges of the metal in 1970. The decline of residues in most species is about 60 percent since 1970 but levels remain above the 0.5 ppm limit.

In Lake Erie mercury concentrations in walleye, white bass, yellow perch and emerald and spottail shiners declined significantly between 1970 and 1975. However, in 1975 the concentrations in larger size groups of carp, catfish, freshwater drum, yellow perch, walleye, and white bass in western Lake Erie still exceeded the FDA limits.

Pesticide and PCB concentrations in Lake Erie fish tissues were found to be within recommended limits.

Lake Ontario

Most indicators suggest that Lake Ontario experienced a period of relatively stable water quality conditions from 1967 to 1975. Signs of improvement have been found in the vicinity of some urban areas, and phosphorus loadings entering Lake Ontario via the Niagara River have decreased since 1967. The major problem areas are Rochester, Oswego Harbor, and the Niagara River (Figure IV-1).

Rochester

The bathing beaches on Lake Ontario near the mouth of the Genessee River at Rochester remain closed because of bacterial contamination. In addition the lake waters in this area continue to be degraded due to erosion, urban runoff and combined, storm, and sanitary sewer overflows. The EPA has demonstration programs underway to establish the magnitude of the problem and to identify cost-effective solutions.

Oswego Harbor

Water quality in Oswego Harbor ranges from poor to fair because of the direct discharge of raw and inadequately treated wastes. Secondary treatment and phosphorus removal facilities are under construction for the west side of the City of Oswego to complement the recently completed facilities for the east side. Upstream discharges, both point and nonpoint, also contribute to pollutant loadings in the Oswego River and the Oswego Harbor area.

Niagara River

Although the Niagara River serves as a receiving body for a multitude of municipal and industrial waste discharges, no violations of the dissolved oxygen standards have been reported in the mainstem. Correspondingly, the BOD, total phosphorus and total coliform levels remain generally low, with the exception of local areas along the New York shoreline.

All of the municipal plants discharging to the Niagara River, with the exception of Niagara Falls, New York, had primary treatment and disinfection prior to 1967. Niagara Falls, while providing chlorination, simply screens its wastewater to remove gross solids and will continue to discharge essentially raw sewage until a secondary treatment plant with phosphorus removal is completed. This plant should be operational sometime in 1977.

All of the municipalities discharging directly to the Niagara River as well as the larger communities on the tributaries are, or will be, providing phosphorus removal facilities. The 1971-72 ban on phosphate detergent appears to have reduced mean levels of phosphate in municipal sewage treatment plant effluents by approximately 50 percent.

Most of the remedial facilities undertaken by industries are scheduled for completion by July 1, 1977.

Other Problems–Algae, Bacteria, PCB's, Mercury

In addition to these specific areas, there are several other problems facing Lake Ontario. Among the problems having the greatest adverse affect on the use of Lake Ontario are nuisance growths of the algae *Cladophora,* unacceptable bacterial levels at a number of public beaches, and PCB and mercury contamination of important commercial and sport fish species.

Nutrient levels, along with the normally occurring conditions of water movement, temperature, light and alkalinity in the lake are such that *Cladophora* growth occurs wherever suitable substrate exists and continues to cause unpleasant shoreline conditions. Currently the most practical means of controlling *Cladophora* is through the reduction of nutrient inputs, particularly phosphorus.

Open waters have been found to be generally free out of any fecal contamination. Heterotrophic bacteria found in the open waters indicate that nutrient loadings from the Niagara River, Metropolitan Toronto, and Rochester areas have a widespread effect on the lake. On the U.S. side, beaches near Rochester continue to be affected by sewage and stormwater overflows.

U.S. Fish and Wildlife Service data for 1970–1973 show that PCB concentrations in Lake Ontario fish were less than the FDA guideline of 5 ppm for 1970 but were greater than 5 ppm from 1971 through 1973. A Canadian report on PCB's in Lake Ontario fish given on November 1975 at a National Conference on PCB's in Chicago, Illinois indicated mean values of less than 5 ppm for 8 species of fish and a mean value of 17.14 ppm for the American eel.

The State of New York has found mercury levels in the some bass species to exceed the 0.5 ppm FDA limit. Mercury levels in fish have not declined significantly since 1973.

In July, 1976 concentrations of the pesticide Mirex exceeding the FDA limit of 0.1 ppm were found in the edible portions of several species of fish in Lake Ontario. New York State subsequently issued an order prohibiting the consumption of seven species of fish. Investigations to determine the sources of the contamination are currently underway.

CHAPTER V

ANALYSIS OF OIL SPILLS

Pollution from oil spills has been a severe and highly visible water quality problem for a number of years. Some of the effects of these spills, such as covered beaches, large oil slicks, and oil-soaked dead birds, are obvious. Other ecological effects can involve subtle changes that over a long period of time could change the composition of aquatic communities or damage the ability of a species to survive.

Spurred by public reaction to the oil production platform blowout which released 700,000 gallons of oil off the Santa Barbara coast in 1968, Congress enacted the Water Quality Improvements Act of 1970, which gave the EPA and the U.S. Coast Guard major responsibilities for preventing and responding to oil spills. These responsibilities are in addition to the numerous State programs designed to deal with this problem. Between 1970 and 1973, the reporting of oil spills by type and location has improved to the point where meaningful evaluations of the data are now possible.

Federal Spill Prevention Programs

A Memorandum of Understanding between the Secretary of Transportation and the EPA Administrator (Nov. 24, 1971) defines prevention responsibility between transportation and non-transportation related facilities. The EPA is responsible for all facilities, both onshore and offshore, that are not related to transportation. Included are facilities that drill for, produce, store, process, refine, or consume oil. The Coast Guard is responsible for transportation related facilities, including vessels, marine facility transfer operations, railroads, tank trucks, and pipelines. Based on this classification, eight source categories have been defined (Table V-1).

Magnitude of Oil Spills

Since 1972 the number of oil spills reported annually has been approximately 10,000 to 12,000, and the total volume of oil spilled has been approximately 20 million gallons per year (Figure V-1). For each of the four years for which data are available, most of the total volume spilled has been accounted for by a very small number of major spills, where major spills are defined as those involving over 100,000 gallons in coastal areas and over 10,000 gallons in inland areas. The number of major spills has ranged from 19 to 30, which is less than one half of one percent of the total number of spills.

TABLE V-1

SOURCES OF OIL SPILLS

- Transportation
  - Vessels
  - Marine facilities
  - Onshore (railroads and trucks)
  - Pipelines

- Non-transportation
  - Offshore (wells)
  - Onshore bulk storage
  - Onshore refineries
  - Onshore facilities (wells)

An analysis of major spills by source for the three-year period for which data are available (1973-1975) shows that vessels, pipelines, and onshore facilities (wells) account for 86 percent of the total major spill volume during the period, with vessels alone accounting for 53 percent (Table V-2). These same three categories also accounted for 68 percent of the total volume from small spills (Table V-2). Overall, spills from vessels alone accounted for 44 percent of the total volume of oil spilled.

A comparison of the volume of oil spilled as a percentage of the volume of oil transported for the different source categories (in 1975) shows that the greatest problems are associated with vessels. For every 10,000 gallons of oil transported in vessels, more than one gallon is spilled

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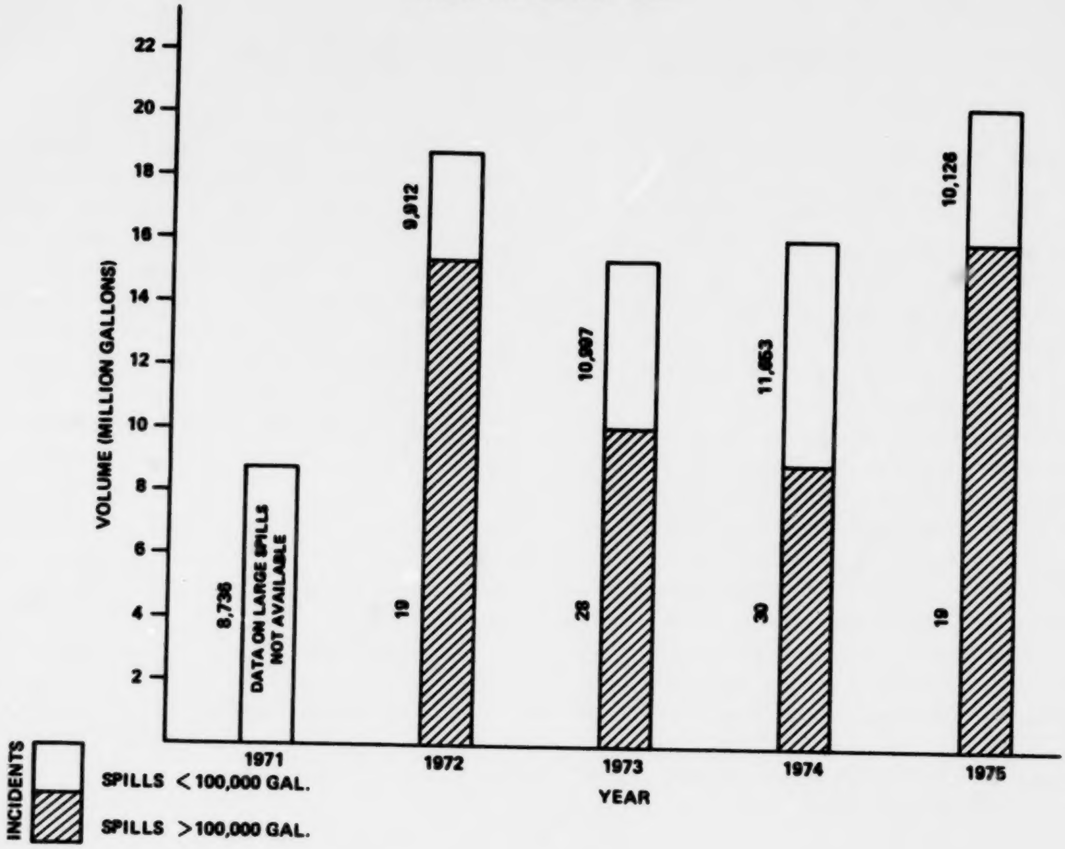
FIGURE V-1
OIL SPILL VOLUME PER YEAR



(Figure V-2). The next highest spill rates are for onshore transportation facilities and onshore wells. The data on oil volume moved by source category for the years 1973-1975 shows that, with the exception of a large increased in marine vessels and facilities volume in 1975, the year-to-year volume changes have generally been small (less than 10 percent) (Table V-3).

Geographically, most of the major spill volume (63 percent) occurred along the Atlantic and Pacific coasts (Table V-4). On the other hand, most of the small spill volume (60 percent) occurred in the Great Lakes and inland areas, with the inland areas accounting for most of this percentage (Table V-4).

Trends in Spill Volumes

Despite the fact that only three year's worth of data were available for analysis, significant trends (chance that trend indication is random was less than 20 percent) were determined for a few of the source categories. For spills of less than 100,000 gallons, there were significant decreases in the volumes spilled from vessels and from bulk storage facilities. These trends would be consistent with known EPA and Coast Guard program activities.

Major spill trends show significant decreases in spills from marine facilities and bulk storage facilities, while significant increases were observed in major spill volumes from vessels and onshore transportation facilities. However, the small number of major spills indicates that these results may not be as meaningful as the small spill trends.

TABLE V-2

SPILL VOLUME BY SOURCES
(millions of gallons)

Source	Major Spills			Minor Spills		
	1973	1974	1975	1973	1974	1975
Transportation						
Vessels	4.20	2.62	11.61	1.27	1.30	1.03
Marine facilities	1.13	0.94	0.00	0.20	0.37	0.10
Onshore	0.00	0.00	0.54	0.49	0.68	0.60
Pipelines	1.57	4.10	1.32	0.87	2.30	1.17
Non-transporation						
Offshore	0.61	0.00	0.00	0.25	0.14	0.08
Onshore (storage)	0.37	0.31	0.12	0.80	0.69	0.36
Onshore (refineries)	0.00	0.70	0.00	0.17	0.05	0.15
Onshore (facilities)	2.00	0.12	2.52	0.76	1.30	0.67
Unknown	0.27	0.16	0.00	0.41	0.38	0.17
Total	10.15	8.95	16.11	5.22	7.21	4.33

FIGURE V-2
RATE OF OIL SPILLED BY SOURCE

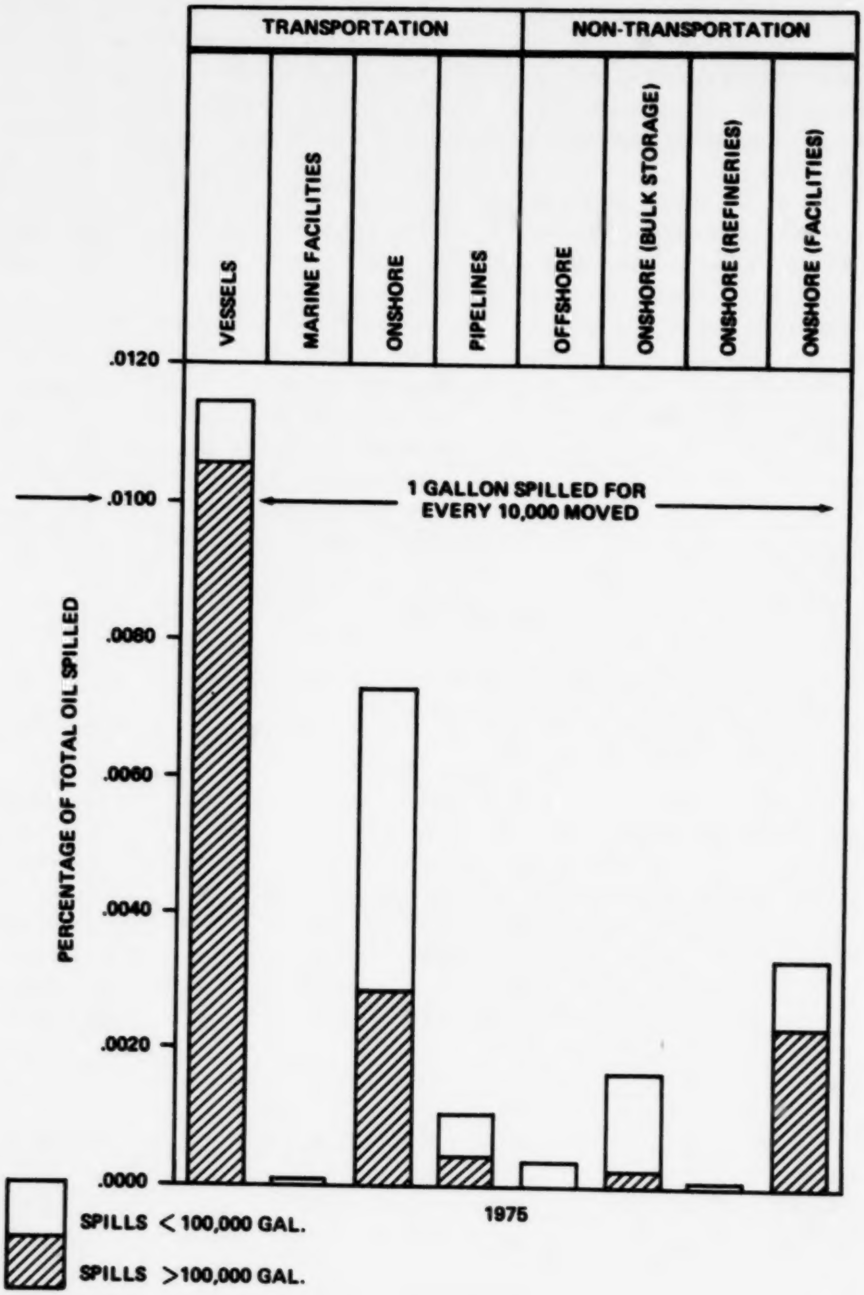


TABLE V-3

ANNUAL MOVEMENT, PRODUCTION AND STORAGE

(billions of gallons)

		1973	1974	1975
Transportation	Marine vessels and facilities	110.4	108.0	190.7
	Onshore	23.9	18.5	19.3
	Pipelines	280.7	272.2	269.2
Non-transportation	Offshore (wells)	24.8	22.8	21.1
	Onshore (bulk storage)	37.6	39.9	42.4
	Onshore (refineries)	190.9	186.4	190.9
	Onshore (facilities)	116.9	112.2	107.1

TABLE V-4

SPILL VOLUME BY GEOGRAPHICAL LOCATION

(millions of gallons)

Area	Major Spills			Minor Spills		
	1973	1974	1975	1973	1974	1975
Inland	4.47	3.51	4.72	2.36	4.74	2.08
Great Lakes	.00	.33	.00	.29	.25	.31
Atlantic Coast	2.84	2.06	6.60	1.33	.97	.86
Gulf Coast	.20	.00	.00	.44	.46	.44
Pacific Coast	2.64	3.05	4.79	.80	.79	.64
Total	10.15	8.95	16.11	5.22	7.21	4.33

APPENDIX A

State and Jurisdictional Summaries

Appendix A provides a listing of summary information submitted by the States and other Jurisdictions for the National Water Quality Inventory Report for 1976.

These summaries have been excerpted directly from reports received from each State and Jurisdiction. The reader can obtain more complete information by writing to the applicable agency included on the title page which precedes each of the following summaries.

APPENDIX A
Summary - State of Alabama

Complete copies of the State of Alabama 305(b) Report can be obtained from the Agency listed below:

Alabama Water Improvement Commission
State Office Building
Montgomery, AL 36104

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Introduction

In 1974, the first water quality report to Congress in accordance with Section 305(b) of Public Law 92-500 for the State of Alabama was prepared. The result was a voluminous report which not only included a statewide review of water quality for 1974 but also contained detailed information concerning the fourteen river basins of Alabama. This information included a description of each basin, water uses in the basin, water quality of the basin, and non-point source pollution in the basin. For 1975, the water quality report to Congress will follow a format similar to that used for the 1974 report; however, in the interest of brevity, the report will only concern itself with water quality.

New information in the form of relative condition factors for selected Alabama fish is included in the 1975 report, and it is expected that such additions will be included in subsequent reports as data are made available. The relative condition factors were computed by using the formula $Kn = \frac{W}{W}$, where W equals the weight of a fish of a specific length and $\widehat{W}$ is the computed weight for the same length, derived from the equation $\hat{W} = aL^b$ for particular species in Alabama river systems. The $\hat{W}$ values were taken from *Tables for Computing Relative Conditions of Some Common Freshwater Fishes* by W.E. Swingle and E.W. Shell. After individual values were computed, an overall average for all fish at the station was reported.

Water Quality

Completion of 1975 statewide trend station monitoring produced data comparable to that obtained during 1974. There was, however, an 8.3 percent increase in stations which met current water quality objectives during 1975 as compared to 1974. A total of 43.6 percent of the trend stations met water quality objectives during 1975, while 35.3 percent of the trend stations achieved current water quality objectives during 1974. Various reasons for this improvement in water quality will be discussed in later portions of this report.

It must be kept in mind that the majority of the trend stations were chosen in order to monitor problem areas in the State and, therefore, the data presented cannot be used to draw precise analogies with the status of quality in other areas of the State. It should also be recognized that the gradual implementation of industrial and/or municipal treatment facilities will manifest itself in an upgrading of water quality in trend station data over time.

Although some improvement in water quality was observed during 1975, two years of monitoring data is still insufficient for observation of long-term trends. Hopefully, a period of five to ten years will produce monitoring data of statistical significance with respect to changes in water quality. This period should also coincide with the completion of the majority of treatment facilities now in various stages of progress, and the expected enhancement of water quality should be evident.

There are, however, situations where the ultimate achievement of water quality objectives is most doubtful. Although improvement in quality may be observed, it is anticipated that such areas will experience a level of quality less than that desired for some time into the future. Such situations are encountered when natural flows of receiving streams are considerably less than the amount of effluent, treated, or inadequately treated waste presently entering the stream.

Total number of trend monitoring stations and stations meeting water quality objectives are indicated in Figure 1. Parameter measured at those stations are listed in Table 1.

TABLE 1

WATER QUALITY DATE AVAILABLE FROM THE ALABAMA WATER IMPROVEMENT COMMISSION TREND STATION NETWORK

*Air temperature
*Water temperature
*Dissolved oxygen
*DO percent of saturation
*Biochemical oxygen demand
*pH
*Alkalinity
*Hardness
*Color
*Turbidity
*Nitrates
*Chlorides
*Phosphates
*Total dissolved solids
*Total suspended solids
*Volatile suspended solids
*Fecal coliform
*Flow
*Weather
*Date collected
*Time collected
**Iron
**Copper
**Zinc
**Chromium
***Cyanide

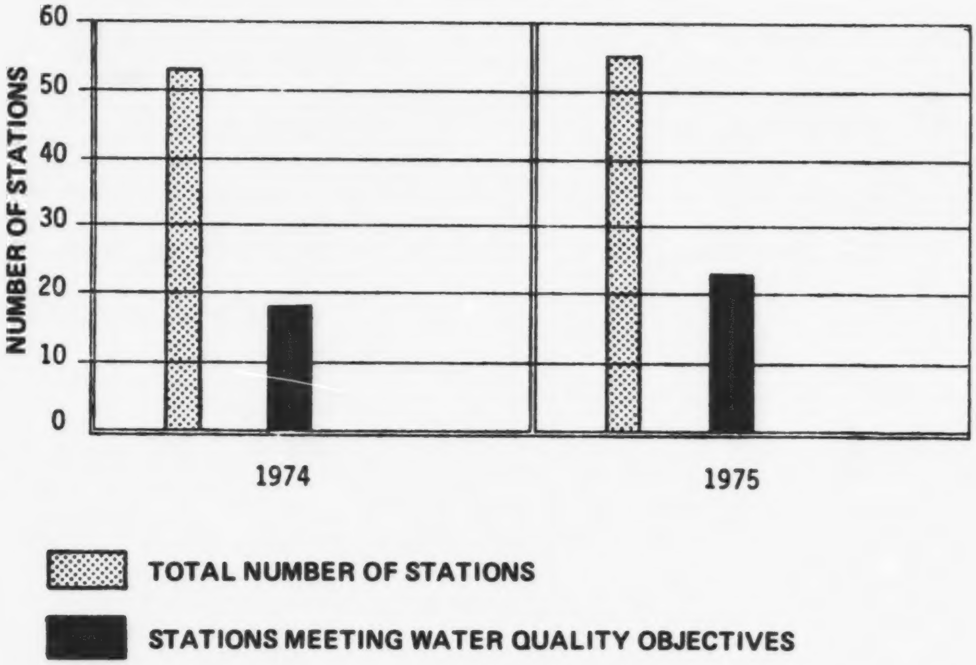
*Monthly.
**Quarterly.
***Annually.

Non-point Source Pollution

With the majority of the Commission's available resources primarily concerned with point source pollution, degradation of water quality resulting from non-point source pollution has not been the focus of extensive evaluation throughout the State. However, with improvements in the point source area, identification and implementation of non-point source pollution abatement will ensue as resources permit. The Commission has taken some initial steps in the area of non-point source pollution, and it is expected that information obtained from the completion of the 208 planning processes will help to identify non-point source pollution and costs associated with attainment of water quality goals where control of non-point source pollution is involved.

FIGURE 1

WATER IMPROVEMENT COMMISSION TREND MONITORING STATIONS AND WATER QUALITY STATUS



NOTE: TREND STATIONS WERE CHOOSEN TO MONITOR PROBLEM AREAS IN THE STATE AND DATA OBTAINED AT THESE STATIONS ARE NOT INDICATIVE OF THE OVERALL STATUS OF THE WATER QUALITY IN THE STATE.

Silviculture

The Commission has adopted certain forest practices guidelines intended to address water quality problems which may be associated with silvicultural practices. These guidelines suggest the use and maintenance of buffer zones and incorporate other recommendations concerning silvicultural activities near watercourses. In addition, a three-year study to evaluate water quality problems and the effectiveness of these guidelines was initiated during the summer of 1975 with the hope that data generated from this study would give some insight into water quality problems associated with operations in Alabama. In conjunction with the adoption of guidelines, a cooperative statewide educational program between the Commission and the State Forestry Association aimed toward the forest industry was initiated. The use of radio, television, and newspapers, along with training sessions, comprise the bulk of this educational approach.

Construction

Cooperation between the State Highway Department and the Commission in the form of Commission staff review of highway project proposals and subsequent recommendations by the staff to ensure water quality is another step to reduce non-point source pollution.

Non-point source pollution arising from dredge and fill projects is being kept to a minimum as a result of the state certification program under the provisions of Section 401(a)(1) of the Federal Water Pollution Control Act Amendments of 1972. All proposed projects are reviewed by the staff to ensure that water quality will be maintained before projects can proceed.

Mining

In 1974, the Commission adopted certain surface mining regulations in an effort to address non-point source pollution from the mining of minerals in the State. These regulations require the submittal of pollution abatement plans prior to the initiation of mining. This prior planning for protection of water quality, when coupled with Staff inspection activity, has been most successful in addressing the water pollution problems associated with mining.

Agriculture

Non-point source pollution problems which result from agricultural activities are handled on a compliant basis. The majority of these compliants are concerned with feed lot operations and aerial application of pesticides. In the former instance, relatively simple and inexpensive treatment and management practices are available, and the Commission's staff works in close cooperation with the Soil Conservation Service and other agriculturally oriented agencies to correct these deficiencies when encountered. In addition, informational materials relating to proper disposal of animal waste are made available and distributed throughout the State.

The Commission's staff worked closely with the Department of Agriculture in the development of regulations concerning the aerial application of pesticides, and participates with the Department to correct problems associated with pesticides where appropriate.

Fish Mortality Associated with Non-point Source Pollution

During 1975, twenty-nine (29) fish kills were investigated by the Commission's staff of which seven (7) were attributable to non-point source pollution (Table 2), while during 1974, eleven (11) fish kills were attributable to this same cause. The reduction for 1975 is manifested in the reduced number of pesticide related fish kills, and it is felt to be indicative of an increased awareness of the problems which can result when the careless use of economic poisons prevails. It is hoped that in the future, the number of pesticide related fish kills will decrease as the users of these economic poisons become increasingly aware of the hazards involved.

TABLE 2

SUMMARY OF 1975 FISH KILLS BY RIVER BASIN AND CAUSE

	Number	Pesticides	Suspected pesticides	Industrial wastes	Municipal wastes	Natural	Construction	Illegal poisoning	Unknown	Transportation	Other
River Basin											
Alabama	3	-	-	1	1	-	-	1	1	-	-
Coosa	3	-	-	-	-	2	1	-	-	-	-
Chattahoochee	1	-	-	-	-	-	-	-	-	-	1
Escambia	1	-	-	1	-	-	-	-	-	-	-
Mobile	5	1	-	-	-	1	-	-	1	-	2
Perdido	1	-	-	-	-	-	-	-	-	-	1
Tennessee	11	1	4	-	-	1	-	-	4	-	1
Warrior	4	-	-	1	1	-	-	-	-	2	-
Total	29	2	4	2	2	4	1	1	6	2	5

APPENDIX A
Summary - State of Alaska

Complete copies of the State of Alaska 305(b) Report can be obtained from the State agency listed below:

State of Alaska Department of Environmental Conservation
Pouch O
Juneau, AL 99811

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Since the State of Alaska did not provide a short summary in its 305(b) Report, this summary consists of excerpts from that report. The following summary was provided by EPA Region X.

Current Water Quality and Recent Trends

Alaska reports that its waters are generally in compliance with water quality standards except in a few areas that are discussed witithin the document. Some percentage of waters within Alaska do not meet standards due to natural conditions. The extent of these conditions was not, and presently cannot, be quantified. Parameters associated with man-induced pollution problems in the State include bacteria, dissolved oxygen, pH, toxic sulfite waste liquor, oil, and suspended solids.

There is an apparent need for an improved water quality surveillance program in Alaska (including trend stations and intensive surveys). Present assessments are based on marginal-to-inadequate data; interpretations and extrapolations of the data are unreliable. Obtaining a minimum data base in Alaska would be costly. Transportation difficulties and extreme weather conditions make sample collection costs almost prohibitive. Region X does not include Alaska stations in the National Water Quality Surveillance System (NWQSS) because the cost to maintain even a few stations would exceed its monitoring budget allotment for the entire four-state region. Additional surveillance funds earmarked specifically for Alaska would be necessary for the Region to initiate NWQSS stations in the State.

Water Quality Goals and Control Programs

Alaska's water quality standards are its water quality goals, and control programs are designed to maintain those standards. In its 305(b) Report for 1976, the State makes the judgement that most waters presently meet Federal 1983 goals. Point source pollution control programs and associated improvements are discussed for several areas, even though most improvements can only be discussed from a qualitative standpoint. Non-point source programs are at an infant stage.

Costs and Benefits

Alaska has made an effort toward defining costs involved in meeting 1983 goals, where there are data available. The State expresses concern over existing and proposed effluent guidelines, which may curtail the pulp and paper and placer industries. Alaska has identified benefits that will be derived by maintaining good water quality, but could not quantify them.

Non-point Sources

Alaska has identified six major non-point source categories of concern. They are siliviculture in southeast Alaska, where a great amount of logging takes place; urban runoff in major cities like Anchorage (Alaska's largest city); village sanitation; road and pipeline construction; waste oil disposal; and placer mining. Natural high sediment levels occur in many of the streams in the State; with little water quality data available, it is virtually impossible to differentiate between natural and man-caused pollution from non-point sources. This point is repeatedly addressed in Alaska's report.

APPENDIX A
Summary - State of Arizona

Complete copies of the State of Arizona 305(b) Report can be obtained from the State agency listed below:

Bureau of Water Quality Control
Division of Environmental Health Services
Arizona Department of Health Services
1740 West Adams St.
Phoenix, AZ 85007

Background Information

Arizona has a wide variety of climatic zones, but most of the State receives less than 20 inches of precipitation a year. Over half the State receives less than 10 inches per year. Evaporation rates are high.

The quality of surface water in Arizona, in general, is near levels associated with natural conditions. The State is fortunate not to have reached the critical point of environmental deterioration that has occured elsewhere in this country. Thus, Arizona's water quality program is concerned more with maintenance than with restoration. However, it is essential that problems be recognized and comprehensive plans developed in time to combat future demands on water resources, provide control of water quality, and provide control of water pollution. Much of the water quality information and studies needed to define problems and provide solutions to water quality problems in the State is inadequate. Data used to prepare this report was limited to that which was readily available. Consequently, this report is not as specific as might be desirable. It is difficult to cite specific violations in water quality because quantity and quality of data are not adequate for this purpose at many locations.

Water Quality and Violations

A total of 336 violations of surface water standards were observed in 1975; 80 in the Fixed Station Network, 48 in the two intensive surveys, and 208 in the Lake Eutrophication Survey. Other violations were observed on miscellaneous samples from time to time, but they have not been tabulated herein.

Water quality is highly dependent upn the geology and morphology of the receiving watershed. In this arid region, surface water comes mainly from surface runoff and shallow precipitation. Base flow is small and can be highly mineralized. Runoff from rainfall and snow melt can be of good mineral quality but high in suspended sediments. In addition, irrigation of soils can contribute significant amounts of unleached salts. During the intensive surveys of the past three years, potential violations in bacteriological, turbidity, pH, toxic metals, and proposed nutrient standards were observed. High turbidity levels following runoff events are common throughout the State. Sources of this turbidity remain to be identified.

Bacteriological problems are associated with agricultural and recreational waters. The two uses are often concurrent, making it difficult to judge the sanitary significance of violations in indicator organisms. Potential problems have been observed in the Verde River, Oak Creek, the Colorado River, and the Salt River Lakes (Roosevelt, Apache, Canyon, and Saguro).

Problems with toxic metals can occur downstream from mining activities in mineralized areas. Areas of concern are the lower reaches of the San Francisco River and San Pedro River, and the reach of the Gila River from Coolidge Dam to the Ashurst-Hayden Diversion Dam.

Violations of nutrient standards, specifically total phosphates, are presumed to be related to municipal and agricultural discharges. However, some contribution may be attributed to leaching of natural phosphates from soils. This relative proportion that is contributed by each source remains to be determined.

Trends

The bulk of data is still too scarce to adequately delineate major trends in water quality, but, with continued operation of the Fixed Station Network, this deficiency will eventually be alleviated.

Some improvements in water quality have occurred in water bodies that serve as receiving streams tor treatment plant effluents. The improvements are traceable either to an improvement in the quality of the effluent due to new plant construction and/or better operating techniques or to a discontinuance of the discharge altogether.

Water quality in some areas has shown a decline because development was so rapid that adequate waste treatment facilities could not keep up. Small existing plants became overloaded and had to discharge inadequately treated water. The Pinetop-Lakeside area has been plagued with failing septic tank systems for years. This problem will hopefully be remedied soon with the construction of a new centralized collection and treatment system. Other areas with similar problems include Greer, Bullhead City, the Parker Strip and areas near Prescott.

Some degradation of groundwater supplies may have already taken place. There is concern about the Globe-Miami area, the area south of Tucson and a new proposed operation in the Tombstone area. Implementation of a groundwater monitoring network should determine the extent of the problem and will undoubtedly uncover some more problem areas.

Program Impacts

In the past, water quality has been inadequate to assess, not only current water quality conditions, but also long-range trends and changes that had resulted from programs of the Bureau, other agencies, and private industry. Recent program activities, resulting from Public Law 92-500, have been significant steps taken to alleviate this deficiency. Intensive surveys were conducted in an effort to begin establishing background levels of water quality. A fixed station network has been implemented to monitor long-term water quality trends and, hopefully, to flag serious degradations in surface water quality at the earliest possible stages. The compliance monitoring program, an integral part of the National Pollutant Discharge System (NPDES), has helped to improve general maintenance and operation of treatment plants across the State, resulting in a better quality effluent.

The greatest positive impact has been on the construction of waste treatment facilities. Such construction has allowed Arizona to maintain the quality of its receiving waters at near natural levels. Twenty-three treatment facilities have been built in the five years preceding FY 76. Twelve facilities were upgraded and eleven were new systems. Five of the new systems reused the effluent in some manner, while six facilities created new discharges which may constitute a degradation rather than an upgrading of water quality.

The permit program, while controversial, has had the benefit of forcing facilities to be concerned about the quality of their effluent. But the program will cause an unnecessary economic loss by upgrading facilities (such as lagoons) that are not causing any problems with receiving waters. Problems will also occur when facilities are unable to meet monitoring requirements. It is difficult to go from no self-monitoring to levels required by 1977. This is particularly true where private laboratories and municipal laboratories are either nonexistent or at minimal levels. The changes in test methodology that are occuring will keep test procedures in turmoil for some time. Some facilities will be reluctant to purchase expensive test equipment for a particular test (coliform—MPN vs. MF) when test procedures are uncertain.

The impacts of basin planning activities and Section 208 planning activities will take some time to materialize because they are, by design, long-range planning programs. However, increased State and Federal presence may have some immediate beneficial impact on programs dealing with water pollution. Several of the basin plans, prepared under contract by outside consultants, are either completed or in the final draft stages. The rest will soon be completed. The 208 planning process is still in its early stages. The Governor of Arizona has designated the six regional Councils of Government (COGs) as the official Section 208 planning agencies. The Bureau's input and role in coordinating these activities has not yet been determined.

Much of the early program grant documents submitted in response to deadlines imposed by PL 92-500 and subsequent EPA regulations were of necessity hastily prepared and are of questionable value. The time spent preparing such documents has delayed working aspects of various State programs. In a State like ours where staffing is meager, the time lost to ongoing projects has been significant. Lost working time can be justified by planning activities that result in future time savings. It remains to be seen whether or not such savings will be realized.

The facilities inspection program and the operator training and certification program probably have the most visible impact on water quality, at least on the quality of wastewater treatment plant discharges. Deficiencies in plant operation and maintenance that are discovered during routine inspections are often corrected either on the spot or shortly thereafter. As a result of the operator training program, the general knowledge of Arizona's plant operators is slowly but steadily improving, the end result being more competently operated treatment plants.

Water Use

The principal water use in Arizona is irrigation agriculture. Two-thirds of the water used is pumped from groundwater reservoirs. Total yearly water use is estimated at 7.7 million acre-feet, 5 million acre-feet of which was pumped from groundwater storage.

Future uses will remain similar, but there will be changes in the use pattern. Municipal and industrial usage will increase. Agricultural usage may decrease as groundwater supplies are depleted.

Segments where Water Quality Standards Will Not be Met

Full implementation of Public Law 92-500 should help maintain the existing water quality levels of Arizona waters. Some problem areas will be corrected through construction and permit activities. However, some problems may remain. There will be problems with streams that discharge only following rainfall events. Such streams are subject to flash flooding and tubidity levels in excess of State standards. Normally dry streams that receive a well-treated wastewater discharge may also present problems. Stream reaches below mineralized areas may have problems with metals accumulation.

Costs to Achieve Water Quality Goals

Costs to support the construction grant program and State water pollution control program, as administered by the Arizona Department of Health Services through September of 1981, are estimated at $617,949,000. Total construction needs are $612,249,000 of the total amount. Program support should require a minimum of $5,7000,000, but this level of funding is unlikely. State and Federal budgets appear to be committed to near current funding levels for program activities; thus $2,450,000 is apt to be available rather then $5,700,000. This will mean that some programs may not be implemented prior to September 1981 while other programs will receive a lower priority.

Control of Non-Point Sources

Non-point sources may contribute bacteria, turbidity, toxic metals and nutrients to Arizona waters in amounts sufficient to cause violations in water quality standards. The nature of the problem has yet to be delineated. It will likely take several seasons to identify and quantify such problems. Sampling sites for such problem identification need to be established. Some locations for non-point source identification were included in the primary monitoring network as required under Section 106 appendix regulations as published on August 28, 1974. However, other stations needed for non-point source evaluation could not be justified because the Section 106 regulations allowed for only intensive surveys and primary stations. Since the parametric coverage required at primary stations was both extensive and inflexible, adequate resources were simply unavailable. The current proposed regulations allow for more flexibility at "Fixed" stations. The new regulations should allow for study of problem areas that require more time than that needed for intensive studies but do not warrant the expense of long-term stations with comprehensive parametric coverage. When data are available to identify sources and pollutant levels, control measures will be studied. Implementation of such control measures cannot be delineated until specific problems have been identified.

APPENDIX A
Summary - State of Arkansas

Complete copies of the State of Arkansas 305(b) Report can be obtained from the State agency listed below:

Arkansas Department of Pollution
Control and Ecology
8001 National Drive
Little Rock, AR 72209

Summary

The most significant conclusion from the analysis of current water water quality is that substantially all of the waters located in the highly agriculturalized Mississippi delta region of Arkansas do not now meet the 1983 aquatic life and recreational water quality goals of the Federal Water Pollution Act Amendments of 1972. Further, due to the nature of the problems, it is considered unlikely that the goals will be met in these waters by 1983 or any time in the forseeable future (see Figures 1 and 2).

With the exception of the main stem of the White River and the upper St. Francis River, none of the major Arkansas delta streams meet all of the water quality requirements for swimming and the propagation of desirable species of fish and aquatic life. In most cases, several of the appropriate parameters are substantially in violation of the minimum requirements. In particular, widespread violations of fecal coliform, dissolved oxygen and turbidity standards occur, and significant contributions of a variety of pesticides are found, including endrin, dieldrin, DDT and its metabolites, and toxaphene.

FIGURE 1

STREAMS OR SEGMENTS NOT PRESENTLY MEETING FISHING AND SWIMMING 1983 GOALS

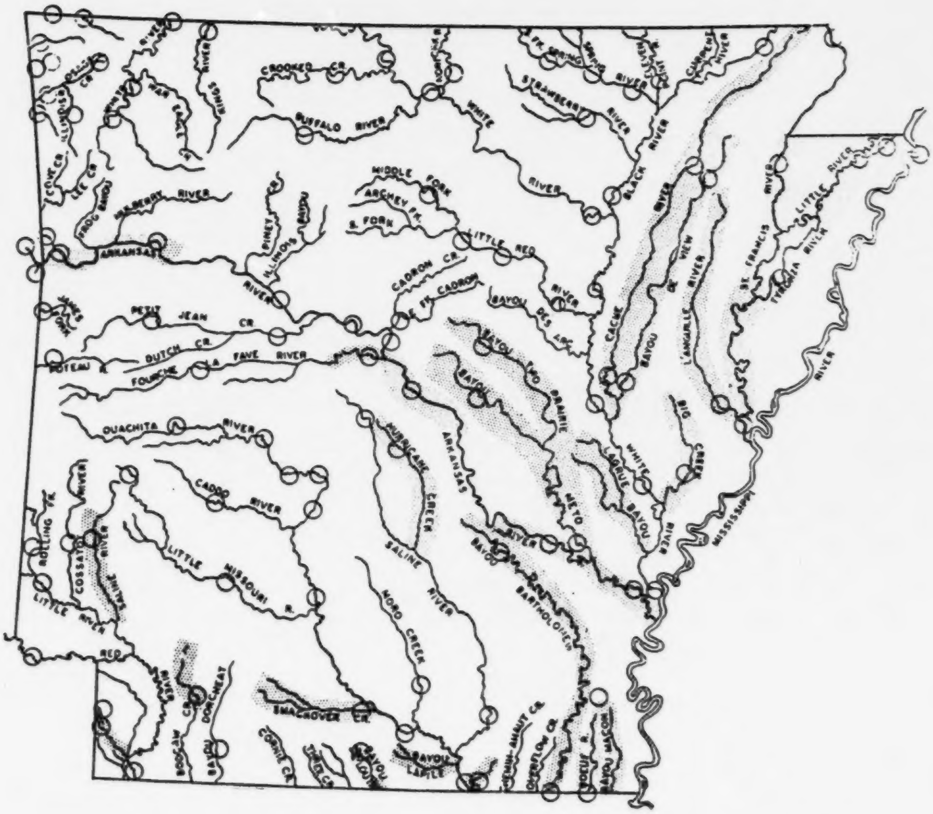
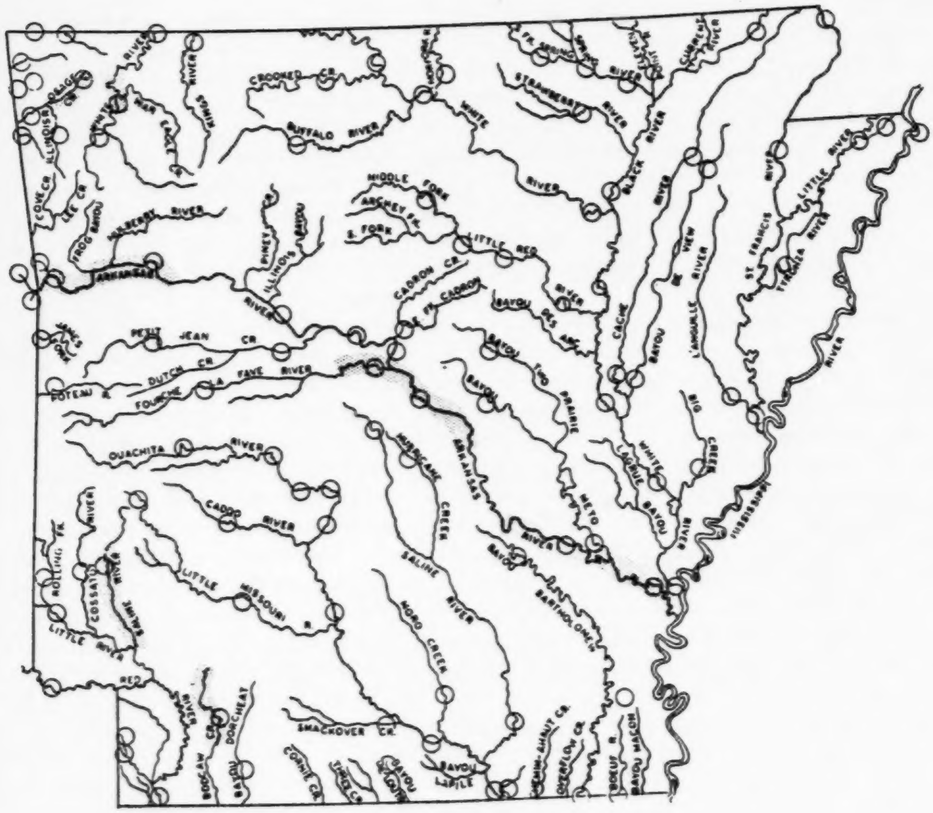

CROOKED CR.
BUFFALO RIVER
WHITE RIVER
STRAWBERRY RIVER
BLACK RIVER
MIDDLE FORK
ARCHEY FK.
S. FORK
LITTLE RED RIVER
CADRON CR.
E. FK. CADRON
BAYOU DES ARC
ARKANSAS RIVER
MULBERRY RIVER
PETIT JEAN CR.
DUTCH CR.
POTEAU R.
FOURCHE LA FAVE RIVER
OUACHITA RIVER
CADDO RIVER
LITTLE MISSOURI R.
HURRICANE CREEK
ARKANSAS RIVER
SALINE RIVER
MORO CREEK
SMACKOVER CR.
BAYOU LAPILE
BAYOU BARTHOLOMEW
BAYOU METO
BAYOU TWO PRAIRIE
LAGRUE BAYOU
WHITE RIVER
CACHE RIVER
BAYOU DE VIEW
L'ANGUILLE RIVER
BIG CREEK
ST. FRANCIS RIVER
LITTLE RIVER
TYRONZA RIVER
MISSISSIPPI RIVER
COSSATOT RIVER
ROLLING FK.
LITTLE RIVER
RED RIVER
OVERFLOW CR.
BOEUF R.
BAYOU MACON
ILLINOIS BAYOU
PINEY CR.
WAR EAGLE CR.
KINGS RIVER
LEE CR.
COVE CR.

FIGURE 2

WATERS NOT CURRENTLY SUPPORTING FISHING AND SWIMMING BUT EXPECTED TO BY 1983


CROOKED CR.
BUFFALO RIVER
WHITE RIVER
STRAWBERRY RIVER
SPRING RIVER
CURRENT RIVER
BLACK RIVER
KINGS RIVER
WAR EAGLE CR.
OSAGE CR.
ILLINOIS R.
COVE CR.
LEE CR.
FROG BAYOU
MULBERRY RIVER
ARKANSAS RIVER
MIDDLE FORK
ARCHEY FK.
S. FORK
LITTLE RED RIVER
PINEY CR.
ILLINOIS BAYOU
CADRON CR.
E. FK. CADRON
BAYOU DES ARC
CACHE
BAYOU DE VIEW
L'ANGUILLE RIVER
ST. FRANCIS RIVER
LITTLE RIVER
TYRONZA RIVER
PETIT JEAN CR.
DUTCH CR.
LA FAVE RIVER
FOURCHE
POTEAU R.
JAMES FK.
OUACHITA RIVER
BAYOU TWO PRAIRIE
BAYOU METO
BAYOU
LAGRUE BAYOU
WHITE RIVER
BIG CREEK
MISSISSIPPI RIVER
HURRICANE CREEK
ARKANSAS RIVER
SALINE RIVER
CADDO RIVER
LITTLE MISSOURI R.
ROLLING FK.
COSSATOT RIVER
SALINE RIVER
LITTLE RIVER
RED RIVER
MORO CREEK
BAYOU BARTHOLOMEW
SMACKOVER CR.
BODCAW CR.
BAYOU DORCHEAT
CORNIE CR.
THREE CR.
BAYOU LAPILE
CHEMIN-A-HAUT CR.
OVERFLOW CR.
BOEUF R.
BAYOU MACON

In the remainder of the State's waters, 1983 water quality goals are now being met or, with a few notable exceptions, are expected to be met by 1983. A number of streams or segments outside the delta are not now meeting the goals due to fecal coliform or dissolved oxygen problems related to point source discharges of inadequately treated municipal sewage. These problems are expected to be cleared up by 1983. Greatest improvements are expected in the main stem of the Arkansas River, which has already shown substantial water quality gains in recent years. Other streams are affected by acid mine drainage or oil field brine problems that will probably improve significantly by 1983 under current programs but will still not meet the stated goals due to the nature of the pollutant input.

In streams where industrial waste discharges occur, the improvements that have been or will be noted by implementation of the best practicable control technology (BPT) requirements of PL 92-500 are often quite significant, but incremental improvements expected by going from BPT to BAT (best available control technology) will often be obscured because of non-point source pollutant input to receiving waters. This is particularly true of industries discharging to south Arkansas streams affected by oil field brines.

Little detailed information is available on the eutrophication potential of Arkansas' lakes. When the results of the 1974 National Eutrophication Survey become available, they will be included in future editions of this report. In general, however, the large clearwater impoundments in Arkansas contain good to excellent quality water but are, in some cases, threatened by rapid and uncontrolled shoreline development, particularly when inadequate methods of domestic waste disposal are used.

Regular water quality monitoring is presently performed on approximately 6,150 miles of the State's potentially fishable, swimmable streams. This total includes all of the major streams of the State. From a purely water quality standpoint, all of these streams would be suitable for the above uses in the absence of man's influences. However, considering the present effects of man's influences on the quality of these waters, it is projected that 4,450 miles, or 72 percent, will meet the 1983 goals of PL 92-500. This leaves 1,700 miles, or 28 percent, that will not meet the goals, generally because of non-point source pollution.

In 1974, a sewerage works "needs" survey for Arkansas was completed. The total amount needed for the correction of all categories of sewerage problems was calculated to be $1,336,858,000.

There are 351 Arkansas towns without any type of sewer system, representing a population of 72,248. Approximately 25 of these communities either have plans completed or construction plans under way for new sewage collection and treatment systems.

There have been very few data collected as yet on the type of treatment needed and costs necessary to meet the best practicable treatment technology (BPT) and best available treatment technology (BAT) requirements for industrial dischargers in 1977 and 1983, respectively. Possibly an industrial treatment costs questionnaire would be the best way to produce this information, and this method will be undertaken if necessary for inclusion in future reports.

There are three major groups of industries in Arkansas that are significant both for the number of people employed and for their polluting potential. These include the food products industry, the forestry-related products industry, and the chemical products and petroleum refining industry. Rough treatment cost estimates were made on various segments of these industries; however, these at best provide only vague indications of total costs.

Recent proposals have been made by EPA relative to permit requirements for point source discharges from concentrated feedlots, silvicultural activities and agricultural operations, including irrigation return flows. As yet we have no information on control costs for these point sources. It might be noted, however, that the establishment of permit requirements for agricultural discharges, such as irrigation return flows and fish farming operations, will have considerable impact in terms of administrative costs alone in a highly agriculturalized state such as Arkansas, with concomitant benefits being rather unlikely.

Information on non-point source control costs is totally lacking. The implementation of Section 208 planning should produce such information.

An assessment of social and economic benefits resulting from pollution control programs must first consider the many aspects of recreation found in and on the waters of the State. There are approximately 10,000 miles of fishable streams and 600,000 acres of man-made and natural lakes in Arkansas. During 1973, 437,081 resident fishing licenses were sold in the State. In 1975, 95,757 trout stamps were issued, and the State ranked 7th nationally by selling 201,348 non-resident fishing licenses.

There are 32 state parks in Arkansas, most of which feature water-based recreational facilities. In 1975, 6,943,000 people visited these parks. There are an estimated 300,000 boats on Arkansas' waters, with boating activities including fishing, sailing, waterskiing and canoeing. During 1975, over 34 million people visited the 20 U.S. Corps of Engineers recreational facilities in the State. It is entirely obvious that water-based recreation provides vast economic and social benefits to the people of Arkansas, and that prevention and control of water pollution is a significant factor in preserving and enhancing these benefits.

In 1975, as a result of water pollution control programs, the classification of two streams was upgraded to permit body contact recreation where such had previously been undesirable due to pollution. Also, two tertiary treatment facilities were completed, which discharge to the watershed of the Buffalo National River, providing a considerable measure of protection for this unique and immensely valuable natural treasure.

The evalution of non-point source water pollution in Arkansas and the development of control programs for the various categories of such pollution is just now getting started under the areawide wastewater management planning provisions of Section 208 of PL 92-500.

As mentioned previously, agricultural non-point source pollution is the category of most significance in Arkansas. The erosion control programs the U.S. Soil Conservation Service, if completely implemented, would result in considerable improvement in the quality of runoff from agricultural watersheds, but it is questionable whether this program alone would allow water quality goals to be met. This would, however, be an important step, and we would welcome the solution of the financial problems that have retarded implementation of this program.

The severity of non-point source pollution from the widespread silvicultural activities in Arkansas is an area of considerable question and controversy. Representatives of all aspects of forestry interests as well as the general public have considered the problem and recommended specific steps to define and control the problems that are found to exist. The formation of a research task force for this and other areas of non-point source pollution is being considered as a part of the Section 208 planning program.

Acid mine drainage continues to be a problem in the bauxite mining areas of Arkansas and in other very localized areas. Control efforts are under way in the bauxite areas that should alleviate the problems somewhat, but a thorough evaluation of the effects of these programs is not scheduled until the summer of 1978.

Information on non-point source pollution related to construction activities and urban runoff will be forthcoming following completion of Section 208 studies planned or in progress for the areas designated as having substantial water quality control problems as a result of urban-industrial concentrations or other factors. These designated areas are Texarkana-Miller County, Little Rock-North Little Rock, Fort Smith and Pine Bluff.

Brine pollution from both point and non-point source pollution in the South Arkansas oil fields is a problem of long standing and will continue to be a problem for some time regardless of control efforts. Recent surveys of this area, however, have resulted in specific recommendations designed to minimize the problems as much as possible.

APPENDIX A
Summary - State of California

Complete copies of the State of California 305(b) Report can be obtained from the State agency listed below:

California State Water Resources Control Board
1416 Ninth St.
Sacramento, CA 95814

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Summary

The purpose of the Annual Water Quality Inventory report is to present a summary of water quality conditions, problems and control activities. The Inventory fulfills the requirement of Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).

Rather than attempt an exhaustive survey and reproduction of all water quality data gathered in water year 1975 (October 1974-September 1975), a task which would duplicate the efforts of numerous local, State and Federal agencies, conditions on selected water bodies have been highlighted.

Historical data for five major representative rivers are presented in Chapter 3 to portray long-term water quality trends. These rivers, the Klamath, Sacramento, San Joaquin, Truckee and Colorado, are each indicators of water quality conditions in important areas of California. Actual data obtained at stations on each of the Priority I rivers are tabulated in Appendix A to this report. In addition, the history of Regional Board activities to improve water quality in San Francisco Bay, Los Angeles-Long Beach harbors and San Diego Bay is highlighted.

Analysis of water quality data for 1975 indicates that conditions in California are generally outstanding and water quality usually meets standards, as shown in Chapter 4. Water quality problems do exist, however, and summarized descriptions of these problems are presented in Chapter 5. The number and severity of water quality problems caused by point source discharges has markedly decreased in the last several years, due primarily to the enforcement activities under the State's Porter-Cologne Act and the stimulus to facility construction provided by grants from the State's Clean Water Bond Fund and from Federal construction grant funds.

The major water quality problems facing the State of California in the next decade will be the most difficult to resolve. These are nonpoint source problems, which are generally widespread geographically, difficult to define exactly, and usually the result of long-held land use practices. Examples are: Sediment and debris washed into streams as a result of logging practices; groundwater mineralization; increasing salinity in the Colorado River which supplies water to large areas of southern California; increasing salinity of the Salton Sea, endangering fish life and the local recreation industry; and seawater intrusion into formerly usable groundwater aquifers at numerous points along the coastline. These problems are often due to complex causes which have their roots in historically institutionalized practices. Solutions will often be prohibitively expensive, as well as politically difficult to achieve. However, these are the major issues which the State and Regional Boards must confront and resolve in order to make significant progress in solving problems related to the quality of California's waters.

The cost of achieving the national water quality objectives established in PL 92-500 will be staggeringly high. Estimates of the costs of meeting Federal objectives for treatment of municipal sanitary sewage and storm water are contained in Chapter 6. A total of 1.6 billion in grants has been committed from State and federal funding sources for constructing municipal sewerage facilities. The total estimated cost of municipal projects needed to meet Federal 1977 waste treatment standards is 4.2 billion.

A brief summary of the impact on the environment of wastewater treatment facility construction and implementation of the control measures necessary to successfully attach the larger non-point source problems is presented in Chapter 7.

APPENDIX A
Summary - State of Connecticut

Complete Copies of the State of Connecticut 305(b) Report can be obtained from the State agency listed below:

Division of Water Compliance and
Hazardous Substances
Department of Environmental Protection
165 Capitol Avenue
Hartford, CT 06115

Executive Summary

Water Quality Monitoring

The State of Connecticut presently operates two types of monitoring programs. These two programs are dissimilar in nature because they have been established for different purposes.

The first program is the short-term intensive water quality program which generates a large volume of water quality data during a relatively short period of time (several days). The purpose of this data is to provide a "complete description" of water quality in a critical stream segment during critical conditions (low flow and high temperature). The value of this program is that with the data generated by this monitoring program, mathematical representations of water quality reactions can be used to predict treatment levels which will result in the achievement or the maintenance of water quality standards.

The second program is the long-term or trend monitoring program. The purpose of this program is to monitor water quality over a long period so that water quality trends may be discovered. The value of this program is that documentation of water quality changes provides the basis of evaluating the effectiveness of water pollution control programs, and indicates a need for redirection or expansion of current water pollution control efforts.

Long-term Trend Monitoring

In 1967, a long-term trend monitoring network or primary monitoring network was established. This network consisted of 96 stations throughout the State. Sample collection and analysis were accomplished during the spring, summer and fall for a total of three samples per station per year. Parametric coverage consisted of physical, chemical, and bacteriological parameters. This network has been replaced by a new monitoring network which was initiated in July, 1973.

The monitoring network, started in July, 1973, consists of 43 stations in the entire State. Samples are collected monthly and are analyzed for physical, chemical, and bacteriological parameters. Additionally, sediment samples are analyzed once per year. This network is expected to be increased to 90 stations as funding becomes available. Table 1 lists the physical and chemical parameters being monitored. In addition to the physical, chemical and bacteriological parameters, the State is also monitoring biological communities. At present, there are 30 biological stations in Connecticut. The inclusion of biological monitoring is a necessary advancement in the monitoring program since Connecticut's Water Quality Standards state: "The water shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life..."

Without biological data to relate the chemical data to the biological communities, compliance or non-compliance with the above requirement could not adequately be determined.

TABLE 1

PHYSICAL/CHEMICAL PARAMETERS MEASURED BY U.S. GEOLOGICAL SURVEY UNDER CONNECTICUT'S PRESENT LONG-TERM MONITORING PROGRAM

Date
Time
Salinity (ppt)
Instantaneous discharge (cfs)
Dissolved manganese
Dissolved iron
Dissolved copper
Dissolved calcium
Dissolved zinc
Dissolved magnesium
Dissolved sulfate
Dissolved chloride
Total phosphorous
Dissolved ammonia nitrogen
Total nitrite plus nitrate
Organic nitrogen
Total Kjeidahl nitrogen
Total nitrogen (N)
Total nitrate (NO_3)
Total organic carbon
Air temperature
Dissolved oxygen
Percent saturation
Weather
Immediate coliform
Fecal coliform
Streptococci (fecal)
MBAS
Color
Turbidity
Oil and grease
Cyanide
Chlorophyll 11-A
Chlorophyll 11-B
Floating algae mats (severity)
pH
Bicarbonate (HCO_3)
Carbonate (CO3)
Alkalinity as $CACO_3$
Hardness (Ca, Mg)
Non-carbonate hardness
Specific conductance
Total residue
Floating debris (severity)

In addition to the biological sampling and analyses, the following are being provided:

1. An extensive literature survey of existing data collected by Federal agencies, universities and private organizations for each body of water samples. The survey will cover physical characteristics and land use characteristics.
2. Sampling reports which will contain a discussion of composition complexity, stability, and productivity of each biological community and detailed interpretation of the significance of these factors with respect to water quality impacts from local land use patterns and direct pollution loadings.
3. An evaluation of the program and program redesign recommendations.
4. A study to determine the most effective manner in which the Department of Environmental Protection can absorb and continue the monitoring program at the end of the contractual period.
5. A field and classroom training program.
6. A reference library.
7. Reference collections.
8. Field and laboratory equipment.

Linear Regression Analysis

The data gathered by the State's long-term trend monitoring network were used to make an analysis which would discern any statistically valid trends over the period of record. The linear regression analysis uses a time-dependent variable (along with other variables such as flow and temperature), to identify trends in the data.

The findings of this study overwhelmingly indicate that water quality in the State of Connecticut is improving. Of the 92 tests performed, 67 or 73 percent show signs of improvement. Of these 35, 40 percent show improvement at the 90 percent level of confidence and 35 tests show that the rate of improvement is significant.

Also, of importance is the finding that of the 92 tests performed only 5 percent show signs of degradation.

As the data base improves and expands in terms of the number of measurements, it is expected that the data will show stronger trends. Most of these trends are already in the direction of improvement. As more measurements are available the trend of improvement should be strengthened.

Most of the improvement which this study reveals is due to the control of point source pollution through the application of best practicable wastewater treatment technology. As the State Water Pollution Control Program progresses to application of advanced waste treatment systems and, as necessary, control of non-point source pollution, improvement in water quality can be expected to continue.

Basin Planning—Section 303(e)

The phase I basin planning process in Connecticut will culminate in June, 1976 with the submittal of the remaining draft basin plans covering the entire State. These plans will include loading allocations for water quality limited segments where feasible. Load allocations for more complex systems or systems with incomplete data bases are still being analyzed. These basin plans will then be incorporated into the annual State strategy for water pollution control.

Area-wide Waste Treatment Management Planning—Section 208

Connecticut submitted an application in May of 1975 for an $8.9 million statewide Section 208 program. This program was not funded by the EPA and the State has initiated a legal action to obtain the funds. (NOTE: In 1976, the state was awarded a $1 million Section 208 grant at 75 percent EPA funding).

Facilities Planning—Section 201

The general cost breakdown for Section 201 construction grants is given in the report. Specific grants by municipality are given in Appendix E of the report, the Construction Grants List. Advanced waste treatment grant allocations reflect load allocation analysis from completed Section 303(e) plans.

NPDES Permit Program—Section 402

In 1975 there were 214 NPDES permits issued. This brings the total permits issued since 1974 to 589. Of the cumulative total, 85 major municipal permits were issued in 1974 and 40 minor municipal permits were issued in 1974-75. The remainder of the permits (464) are non-municipal.

Past Activities

Connecticut began a statewide program of comprehensive water pollution control in 1925 when it established the State Water Commission. This commission established a pollution abatement program in conjunction with the State Department of Health. In 1957 the State Legislature superseded this commission with the Water Resources Commission. Connecticut drafted the Clean Water Act in 1967. This act called for the restoration of water quality consistent wtih the uses and wishes of the State's citizens. The subsequent water quality standards prepared by the State in 1967, were approved in total by the Federal government in 1970. These stream classifications were revised in 1973 by the State to reflect water quality improvements. The Water Resources Commission acted as the State Water Pollution Control Agency until the present Department of Environmental Protection was established by the General Assembly in 1971.

Before 1972, the State's water quality goals did not require a minimum standard of "B" for every stream in

Connecticut. The new goals, in part a result of the 1972 Amendments, will have effects on future growth and development patterns, due to the cost of attaining and maintaining these goals. State programs for clean water have attempted to address water quality problems which result from many sources including septic system failures, the discharge of inadequately treated domestic sewage and industrial wastes, periodic raw sewage discharges resulting from combined storm and sanitary sewer systems, and the effects of groundwater and surface water inflow and infiltration to sewers as well as those of urban runoff and other "non-point" sources. Much of the momentum gained under Connecticut's Clean Water Program initiated in 1967 was reduced when the State could no longer pre-finance water pollution control projects. The momentum was further reduced due to several procedural requirements of PL 92-500.

Progress

A survey was conducted in 1975 by the Water Compliance Unit of DEP to determine the progress made in upgrading water quality. The survey found that since 1967, 165 stream miles or 25 percent of all State streams requiring upgrading have been improved to comply with the 1983 water quality goals. These improvements are mainly attributable to the success of the State's program in expanding and upgrading treatment plants to secondary treatment providing extensions of sewer serve where needed, eliminating or providing appropriate treatment of industrial waste discharges and eliminating a number of raw sewage discharges caused by sewer system infiltration and combined storm and sanitary sewer systems.

A summary of water quality inventory indicates that all basins suffer from non-point source pollution in varying degrees. Large river basins with water quality limited segments like the Connecticut River are hampered in improvement efforts because of combined sewer and non-point source problems. As basin plans are completed, the State will develop its strategy for meeting these future water quality needs. The progress of improving water quality will depend largely on the levels of Federal construction funding realized for this purpose especially with respect to allocations for combined sewerage facility correction which are presently non-existent and where administration requirements limit the ability to realize project goals with available funds.

APPENDIX A

Summary - State of Delaware

Complete copies of the State of Delaware 305(b) Report can be obtained from the State agency listed below:

Division of Environmental Control
Department of Natural Resources and
Environmental Control
Tatnall Building, Capitol Complex
Dover, DE 19901

Summary

Delaware's streams are generally in very good condition. As reported last year, ten stream segments are already meeting the 1983 goals of the Federal Water Pollution Amendments of 1972. Four additional segments are expected to meet these goals by next year. The remaining seven should be able to meet the goals by 1983.

Most of Delaware's streams support the propagation and maintenance of fish and wildlife. The major area where this is not the case is the Delaware River from the State Line to the vicinity of the Chesapeake and Delaware Canal where pollution prevents some, though not all, species from flourishing.

Improvements in this section of the river remain dependent upon the upgrading of major industrial and municipal treatment facilities upstream in the States of Pennsylvania and New Jersey. The elimination and/or control of point sources in the stream basins have highlighted non-point sources which include pollution of man-made origin from urban and industrial areas, and that of natural origin such as wildlife and waterfowl. During the remainder of this decade, Delaware will concentrate on quantifying the effect of the non-point source problems and attempt optimum control strategy. Completion of Section 208 Plans by areawide waste management agencies will assist the State in this effort. An evaluation of the State's water quality is presented in Table 1 at the end of this summary.

The United States Environmental Protection Agency (EPA) has delegated its authority to the Department of Natural Resources and Environmental Control (DNREC) for issuing National Pollution Discharge Elimination System (NPDES) permits. These permits establish a timetable for meeting the State and Federal requirements of best practicable technology by July 1, 1977. Some municipal waste discharges cannot meet the deadline because construction, although underway, will not be completed by that date. The permit requirements have also eliminated a number of discharges which are now connected to wastewater collection and treatment systems or converted to another type of discharge, e. g., spray irrigation.

Delaware's Water Quality Management Program is a continuing one and recognizes that issuance of permits alone does not mean achievement of all standards. It takes years for plans and programs to be put into effect and, once completed, additional time is needed for the various stream segments to recover. In some estuaries it may not be possible to meet shellfish and swimming criteria for total and fecal coliforms because of the substantial migratory bird population.

The State has a continuing concern with ground water quality degradation and is taking forceful action to prevent it. The experience with landfalls that have resulted in aquifer contamination has led to the establishment of strict, new standards for such disposal methods. Both their location and construction are carefully regulated. The expanding population of Delaware has also increased the demand for septic tank use and this, too, is being carefully scrutinized and regulated.

Delaware also faces eutrophication problems in most of its lakes and ponds. The Department has cooperated with the EPA in the National Eutrophication Survey of Selected Ponds in the State of Delaware.

Another problem enumerated last year is the encroachment of urban development along the shores of the inland bays. The growth rate of such development has been slowed because of economic conditions, but the potential exists for accelerated growth with the improvement of the economy.

The cost estimates for wastewater treatment facilities have not changed from last year's report. Many water and related land use activities will, it is hoped, reduce the total costs through non-structure control programs.

In order to provide a uniform basis for various planning activities a special consortium of planners representing all interested parties was created to study population projection procedures. This effort has resulted in a new population forecast for the coming decade which will be used by all agencies.

This summarizes Delaware's problems and its plans to cope with them as we move to make all of our water quality compatible with the goals established by Congress.

TABLE 1

1975 SEGMENT EVALUATION

Segment description	Segment number	Classification WQL/EL	State priority	Evaluation of water quality
Naaman's Creek	1	EL	15	III
Brandywine Creek	2	EL	12	I
White Clay Creek	3	EL	7	II
Upper Christina	4	WQL	1	II
Lower Christina	4	EL	1	III
Red Lion Creek	5	WQL	10	II
Chesapeake & Delaware Canal	6	WQL	9	I
Blackbird-Appoquinimink	7	EL	4	II
Chesapeake Drainage System	8	EL	19	I
Smyrna River	9	EL	11	II
Leipsic River	10	EL	14	II
St. Jones River	11	EL	6	II
Choptank River	12	EL	20	I
Murderkill River	13	EL	13	II
Mispillion River	14	EL	16	II
Cedar Creek	15	EL	17	II
Broadkill River	16	WQL	8	III
Nanticoke River	17	WQL	3	I
Indian River	18	WQL	2	I
Little Assawoman	19	EL	5	II
Buntings Branch	20	EL	18	III
Delaware River - River Mile 78.8 to river mile 59.5				III
59.5 to river mile 48.2				II
Delaware Bay				I
Atlantic Ocean				I

NOTE: A detailed assessment of each segment is provided in the text of the report.

KEY:

I -- Waters of good to excellent water quality which basically meets all water quality criteria with only minor, infrequent violations of water quality standards.

II -- Waters of fair to good water quality which periodically have some problems in one or more water quality criteria.

III -- Waters in which there is perennial problem in meeting one or more water quality criteria. Most of these are tidal waters impacted by the natural process of the estuarine system.

APPENDIX A

Summary - District of Columbia

Complete copies of the District of Columbia 305(b) Report can be obtained from the State Agency listed below:

Department of Environmental Services
Water Resources Management Administration
415-12th St. NW Room 307
Washington, D. C. 20004

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This report represents the first annual update of the 305(b) Report for the District of Columbia. It is an appendix to the 1975 305(b) Report issued in April 1975. As an appendix, this report details only progress and problems the District has had in implementing the provisions of the 1972 Federal Water Pollution Control Act (PL 92-500) in the past year. Information concerning previous water quality trends and historical aspects of the problems the District faces can be found in the 1975 305(b) Report.

Construction Progress at Blue Plains Wastewater Treatment Plant

Much progress has been made toward the implementation of full secondary treatment at Blue Plains. During 1975, contracts for additional secondary treatment facilities achieved 90 percent completion. Contracts on solids processing, primary flow metering, the chemical building, the multi-media filtration facility, and the central operations facility were in progress all year. All of these contracts are approaching completion. Contracts for nitrification sedimentation, instrumentation, and expansion of a raw wastewater pumping station were initiated in 1975. These contracts were 28 percent, 36 percent, 5 percent, and 2 percent complete respectively at the year's end.

Construction during 1975 was slowed by a six-month labor strike. As a result, construction slipped about six months behind schedule. Completion of all construction is now scheduled for late 1978, with facilities coming on line in mid-1979.

NPDES Permit Program

The District has not elected to seek the authority to issue NPDES Permits. The District, however, has retained certification authority. Authority and responsibility for issuing the permits lies with the EPA. The EPA issued no permits to industrial or commercial discharges in the District during 1975.

Monitoring Program

The D.C. Department of Environmental Services' (DES) Bureau of Wastewater Treatment's monitoring program remained unchanged throughout 1975. Results were circulated and monthly summaries released. Some biological sampling was done in cooperation with William T. Mason of the Interstate Commission on the Potomac River Basin. Biological sampling will be upgraded in 1976, with the addition of a biologist to the Bureau of Wastewater Treatment laboratory staff.

In addition to the sampling program of the Bureau of Wastewater Treatment, the DES, Bureau of Air and Water Quality Control sampled 24 stations in free flowing streams, including Rock Creek. The number of stations was reduced to 10 in 1976. Samples are collected monthly and processed at the Bureau of Wastewater Treatment's Blue Plains Laboratory. Due to a lack of staff, Rock Creek samples were not taken during January, February, May, July, August, and November.

During 1975, work started on the formulation of PEP, a comprehensive monitoring plan for the Potomac Estuary. The Interstate Commission on the Potomac Basin was requested to formulate a monitoring program which would address two major issues: First, changes in water quality which occur as the result of improvements in area wide waste treatment in the absence of denitrification at Blue Plains; and second, data required for the calibration and verification of mathematical models capable of predicting the additional improvements which would occur in estuarine water quality if denitrification were to be implemented at Blue Plains. The results of PEP will be integrated with the District's Water Quality Monitoring Program in 1976.

Sludge Disposal

Disposal of Blue Plains sewage sludge, both raw and digested, has been and will continue to be one of the most serious, difficult, and complex problems facing water pollution control efforts in the District. During 1975, a court-ordered agreement specifying the responsibilities of each of the jurisdictions using the Blue Plains facility, with regard to sludge disposal, want into effect. Daily operations of the trenching of sludge have gone relatively smoothly under the provisions of that agreement.

Trenching, however, cannot continue to be the method of choice for sludge disposal much longer. One prime reason for this is the large amount of land which will be required to hold the increasing daily volume of sludge to be produced at Blue Plains. Some 600 acres/year would be required for the 1980 production of 1,800 wet tons/day. Further, since the disposal sites are not to be used for other purposes for a minimum of five years, a minimum of 3,000 acres would be required on a continuing basis. An investment of this size is impractical given the current value of land in the metropolitan area.

Attempts at providing viable alternative methods of sludge disposal have been stymied because of the other environmental problems they may create. A pilot facility designed to produce a commercial soil builder from the sludge has run afoul of stringent air pollution control requirements. Incineration also contributes to the air pollution problem and is quite costly, and also could contribute to violations of Federal Ambient Air Quality Standards. Composting of the raw sludge seems to be technically feasible and financially attractive, if a market for the compost can be found. However, no real marketing to test salability can take place until the necessary approvals are obtained and health permits are issued.

The Blue Plains Technical Committee, in response to the court requirement that agreement be reached on a permanent solution to the sludge problem by July 1, 1976, has been developing a program which would provide such a solution. No final agreement was reached in 1975. When such an agreement is reached it will balance the risks and benefits of the alternatives outlined above.

Non-point Source Programs

Through 1975, the District sought EPA approval for an engineering study of treatment alternatives for combined sewage overflows. As of this writing, approval for the study has been given, but contracts have not been signed.

The District has been participating in the development of non-point source studies by the Metropolitan Washington Resources Planning Board (WRPB) for the Section 208 planning program. As presently conceived, these studies should provide a firm estimate of the amounts of non-point source pollutants contributed to the estuary by land in various kinds of use. Pollutant loadings will also be related to type, frequency, and duration of storms.

Primary data for the study will be gathered in the Occoquon and Four Mile Run watersheds of Northern Virginia, directly across the Potomac from the District. Demonstration of the applicability of the results of the Northern Virginia studies to other jurisdictions in the metropolitan area will be accomplished by using the Northern Virginia data to preduct pollutant loadings for watersheds in Montgomery County, Maryland, and then comparing those predictions to actual data to be taken in the same Montgomery County watersheds.

The WRPB studies, in conjunction with the District's combined sewer engineering study will provide the necessary data base for formulating a rational, efficient, coordinated program for non-point source controls in the metropolitan area.

1975 Water Quality

Water Quality in the District's three major streams, the Potomac, the Anacostia, and Rock Creek will be discussed seperately.

Potomac River

With the exception of coliform bacteria, water quality in the Potomac mainstem of the District was quite good. No nuisance algal blooms of note were recorded, and dissolved oxygen problems, so prominent in the past seem to have diminished. No violations of DO standards for the mainstem were recorded in 1975. Water quality in the Potomac mainstem was probably improved by the high flows recorded in 1975.

Coliform measurements in the Potomac frequently violated the District's standards. Because of this, the Potomac did not meet the FWPCA 1983 goals of 'fishable and swimmable water.

Anacostia River

Water quality in the Anacostia remains very poor. Major problems are low dissolved oxygen and high coliform levels. The extremely poor water quality in the Anacostia is due both to the District's own urban and combined sewer runoff and the high levels of pollutants entering the District from the Anacostia tributaries in Maryland.

Rock Creek

Very scanty data are available from Rock Creek for 1975. No creditable conclusions as to water quality trends can therefore be drawn. Few dissolved oxygen problems seem to exist, coliform counts are quite high, and suspended solids are quite variable, as is to be expected in a small urban stream.

Future Water Quality

As reported in the 1974 305(b) report, modeling studies done for the National Commission on Water Quality indicate that dissolved oxygen standards in the estuary will be met when full secondary treatment facilities are on line at Blue Plains. The 1975 Water Quality data gathered by the District substantiates this conclusion.

Most of the District's remaining water quality problems are due to non-point sources of pollution, both in the District and in the surrounding metropolitan area. The Metropolitan WRPB is undertaking the responsibility for Section 208 Planning in the metropolitan area. One of the major responsibilities of the planning effort is to prepare an areawide scheme for control of non-point source pollutants. Until this plan is complete it is impossible to speculate on the extent of future improvements in water quality problems caused by non-point source pollutants.

Regardless of the plan formulated by the WRPB, the control of non-point source pollutants in the Washington Area is expected to be a difficult and complex task. Therefore it is not anticipated that the 1983 water quality goals of PL 92-500 will be met in the streams of the District by 1983. In particular, bacteriological standards violations will still likely occur, making swimming hazardous. In addition, there will likely remain the potential for noxious blooms of algae in the estuary. Large diurnal variations in dissolved oxygen are likely as a result of such blooms, if and when they occur, causing temporary but perhaps critical violations of dissolved oxygen standards.

Cost of Water Pollution Control

Costs for water pollution control in the District have risen markedly since the early 1950's. In fact, costs per-million-gallons treated will have risen ten-fold when the facilities currently under construction have been completed. This is largely due to the approximately 500 million dollar capital cost of Blue Plains expansion. If denitrification facilities are constructed, capital costs will rise yet another hundred million. O&M costs for the Blue Plains plant are estimated to be about 35 million per year without denitrification, and over 46 million per year with denitrification.

Costs for storm water treatment in the District cannot be firmly estimated at this time, but could conceivably be higher than 1 billion dollars. Since no NPDES permits have been issued to industrial dischargers, industrial waste treatment cost estimates are not available at this time.

Obviously, such large costs will be hard for the District's taxpayers to bear, even with Federal grants. The District believes that the benefits to be derived from such enormous proposed expenditures must be critically examined.

APPENDIX A

Summary - State of Florida

Complete copies of the State of Florida 305(b) Report can be obtained from the State agency listed below:

Department of Pollution Control
2562 Executive Center Circle
Tallahassee, FL 32301

Summary

The water resources of Florida are among the most unique, valuable, and widespread of any State in the Nation. The shoreline of Florida fronts on the Gulf of Mexico and the Atlantic Ocean. Including saltwater rivers, islands, bays, and sounds, the shoreline extends for nearly 11,000 linear miles. Inland waters include 1,711 named streams ranging in length from 0.4 miles to 818 miles. There are 7,712 named and unnamed lakes ranging in size from one acre to almost one-half million acres. The only living coral reef in the continental United States forms the eastern barrier of the Florida Keys.

The wildlife resources of Florida are numerous and diverse. Commercially valuable fisheries harvest shellfish and finfish. Water sports, including sport fishing, in conjunction with the mild climate, act as attractions to the millions of tourists who visit Florida annually.

Freshwater streams are being considered as potential sources of potable water for the rapidly growing metropolitan areas of southern Florida, and these same streams are being proposed for impoundment and industrial development. Maintaining the quality of its waters must be a high priority of the State since the economy of Florida, more than that of most other States, relies on activities which are dependent upon the aesthetics and the natural resources associated with plentiful supplies of clean, high quality water.

Even though clean waters are an economic asset of considerable value to the people of Florida, considerable stresses have been placed on the aquatic systems of Florida by industrial development and by the rapid, recent increase in the population. (Florida's population has increased by the greatest absolute number of any State in the past few years, and it has been projected to double by 1985.) Florida waters are polluted from several different sources. Industrial polluters include agricultural processors, chemical plants, paper mills, and electrical power plants. Domestic wastes from households and wastes from smaller commercial operations are discharged to the waters of the State by sewage treatment plants, ocean outfalls, and septic tank drainage. Pollutants not attributable to specific sources include storm runoff from urban areas; drainage from farms, forests, and mines; intrusion of saltwater into depleted freshwater aquifers; and discharges from ports and marinas. Another major source of pollution in Florida is dredge and fill activities involving the destruction of submerged lands and wetlands, disposal of dredged spoil, and shoreline alteration.

This latter source of pollution is a particular problem in Florida. Large numbers of people from other parts of the country are retiring to Florida or are building vacation houses here. This influx of people has contributed to large demands for water-front property. This has been met by land developments in which canals have been dredged through wetlands and uplands, marshes have been filled, and canal-front lots are constructed. These land use practices have stressed the aquatic ecosystem by eliminating natural drainage and allowing poor water quality conditions to develop, by removing productive wetlands from the ecosystem, by reducing the habitat available for larval fish and shellfish, and by reducing the capacity of the wetlands to filter pollutants from runoff. These problems taken together make uncontrolled proliferation of canal systems and shoreline alteration a serious long-term Florida water quality problem. In the long term, these activities may have the potential to damage or to destroy many of the aesthetics and natural resources which originally attracted retirees and vacationers to Florida.

More immediate water quality problems are related to cultural eutrophication, the human-aided and abetted increase in the rate of aging of a body of water. Data presented in this report show that the levels of nutrients (nitrogen and phosphorous) in almost every basin segment in Florida are higher than the accepted norms. Secondary water quality problems demonstrated by data in this report include low levels of dissolved oxygen and high populations of coliform bacteria. More rarely, high levels of phytoplankton are found.

The State of Florida has responded to the problem of water pollution by adopting and implementing a number of environmental protection statutes (e. g. Chapters 253, 373, and 403, F. S.). In Florida, the Department of Environmental Regulation is the administering agency for programs under the Federal Water Pollution Control Act of 1972 (P. L. 92-500). The goals of the Federal and State programs are to manage discharge of domestic and industrial waste, to control non-point source pollution, and to regulate the alteration of bottoms and shorelines of State waters. The State has also adopted minimum conditions for the quality of its waters and has established a water quality classification based on the uses of water bodies.

Point discharges of domestic and industrial wastes are permitted under State and Federal (NPDES) programs. Non-point source pollution will be managed by the State and by the areawide 208 programs and by management practices to reduce pollutants in runoff. The State has a well-developed permitting system to require permits for construction projects affecting submerged lands and wetlands. Such projects are evaluated for immediate and long-term impacts on the aquatic ecosystem. These programs are discussed in more detail in Chapters II and III of this report.

Ten bodies of water in the State did not meet the Class III water use criteria (safe recreation and fish and wildlife) in 1975. Six of these waters are expected to be consistently within these criteria by 1983. Maintaining and enhanceing water quality in the waters of the State will require more advanced treatment of domestic wastes, control of non-point sources of pollution, and greater protection of wetlands. These programs are necessary to maintain the quality of the Florida environment, and they will become even more urgent if the population increases as rapidly as has been projected.

APPENDIX A

Summary - State of Georgia

Complete copies of the State of Georgia 305(b) Report can be obtained from the State agency listed below:

Environmental Protection Division
Department of Natural Resources
270 Washington St., S.W.
Atlanta, GA 30334

Summary

Current Water Quality and Trends

Most of Georgia's waters are of good quality. Since there are more than 1,500 wastewater discharges from municipalities, industries, and private developments in the State, and since there are many non-point sources of pollution which have significant effects on water quality, the 130 water quality monitoring stations being operated cannot assess adequately the effects of all point and non-point sources of water pollution in the State. However, monitoring stations are located on major streams at sites which do not reflect much of the human impact on the State's waterways. Based on this network of stations, intensive stream surveys, operating reports from wastewater treatments facilities, and other staff knowledge, water quality in Georgia can be characterized as good or excellent for approximately 90 percent of the estimated 20,000 total miles of streams. Unfortunately, many of those streams not meeting water quality standards are major ones where significant water uses are adversely affected.

It is estimated that approximately 90 percent of all the stream miles in Georgia were meeting fishing and swimming water quality criteria in 1975. Less than 90 percent of the mileage of major streams met these criteria, however. It is further estimated that some 5 percent of Georgia's streams cannot meet the water quality criteria for fishing or swimming due to natural conditions. These waters include primarily the swamp-like streams of South Georgia which exhibit naturally low dissolved oxygen, low pH (acid), and high water temperatures during summer and fall months. The fact that these natural waters in South Georgia and other parts of the State do not meet fishing and swimming criteria certainly does not mean that they are not fishable and swimmable. People have recreated in certain of these waters for years, and fish have thrived in these streams for thousands of years.

As in past years, water quality criteria violated most were those for dissolved oxygen and fecal coliform bacteria. Suspended solids, originating from soil erosion caused by man's land-disturbing activities, and the resultant desposition of sediment in streams, continues to be the largest water quality problem caused by non-point sources of pollution. Significant water quality deterioration due to heavy metals, pesticides, toxins, acidity, and alkalinity were not observed in Georgia in 1975.

Major problem areas in the State during 1975 continue to be the South River downstream from the City of Atlanta and DeKalb County; the Flint River downstream from Atlanta, College Park, and Clayton County; and the Chattahoochee River downstream from Fulton County, Cobb County, and Atlanta. There continue to be periodic water quality standards violations downstream from urban/industrial areas such as Albany, Athens, Augusta, Brunswick, Columbus, Dalton, Macon, Rome, Savannah, and Valdosta.

The trend-monitoring program has shown that the water quality is stable at most of the 130 stations around the State and that definite improvement trends are occuring at a number of stations. No downward trends of water quality have been documented.

Water Quality Goals

The Federal goal of having all waters in the United States meet fishing and swimming criteria by 1983 will not be accomplished in Georgia. Certain streams in the State will not be able to meet thse criteria due to their heavily urbanized watersheds which result in poor quality urban runoff; other streams are so small in relation to the amounts of wastewater discharged into them that it will be economically and perhaps technically impossible for some discharges to provide sufficiently high degrees of treatment to allow water quality standards to be met.

It is not possible to predict the locations where and extend to which human influence will prevent waters in Georgia from meeting the 1983 Federal goal of meeting fishing and swimming standards, but it is believed that those stream segments unable to meet the standards in 1983 will be less than 19 percent of the total stream miles in the State, if sufficient Federal construction grant allocations are provided for municipal wastewater treatment needs between now and then. The estimated 5 percent of all stream miles in Georgia which cannot meet fishing and swimming water quality criteria due to natural conditions will not change. There are at least two dozen industries discharging treated wastewater to streams so small that it is fairly certain that levels of treatment in excess of best available technology economically achievable (BAT) will be required if the streams are to meet fishing criteria. There are some 166 municipally owned wastewater treatment facilities presently discharging to stream segments where levels of treatment higher than secondary are needed in order to meet water quality standards. Facilities Planning under the Federal grants program should be completed for nearly all of these municipal discharges by the end of 1977; this planning will determine what needs to be done and how much it will cost to solve these water quality problems. Until the planning is completed, it will not be known to what extent these municipalities can financially and administratively implement programs to achieve water quality standards.

Effects of Control Programs on Water Quality

Georgia's water quality control programs for point sources of wastewater are currently based on the following strategies:

1. Require municipalities to use PL 92-500 grants for construction of treatment facilities where needed to upgrade the quality of municipal effluents to secondary treatment standards or higher treatment standards where required by water quality in receiving streams; and

2. Require all industrial dischargers to meet Best Practicable Technology (BPT) treatment standards or higher treatment standards where required by water quality in receiving streams.

Municipal grants are awarded in accordance with Georgia'a construction grants priority system with the highest priorities being put on solving the most serious water pollution problems. Only about 1.5 percent of all municipal wastewater generated in the State is receiving primary treatment or no treatment, but in many cases existing treatment facilities do not meet the Federal effluent guidelines and/or do not provide treatment sufficient to meet water quality standards. Eighty-four of Georgia's 106 major industrial dischargers were in various stages of design or construction of BPT facilities. Of 455 minor industrial dischargers in Georgia, it is estimated that about 50 percent were providing BPT for their wastewaters at the end of 1975.

A number of significant water quality improvements were seen in major streams around the State in 1975 as a result of the State's control programs. The Lower Savannah River showed no dissolved oxygen violations at the Fort Jackson monitoring site for the first year of record (i. e., the period of years over which official water quality data have been collected), due to completion of treatment facilities at all major sources of organic wastewater. Water quality in the Ocmulgee River improved substantially as a result of the start-up of Macon's Rocky Creek water pollution control plant. Only two violations of dissolved oxygen criteria were found at the Ocmulgee River automatic monitor downstream of Macon during 1975, as compared with 144 violations in 1974. Water quality in the Conasauga River at Tilton downstream from Dalton continues to show an upward trend due to that City's water pollution control programs. Again, 1975 was the first year of record in which no dissolved oxygen violations were found at the Tilton monitoring site.

Substantial improvements in the quality of the Chattahoochee River are expected in 1976 since construction will finally be completed on the City of Atlanta's R. M. Clayton treatment plant and improved operations are expected at the other major treatment facilities discharging to the River. Current control programs underway in DeKalb and Clayton Counties and the City of Atlanta will significantly improve the quality of the South and Flint Rivers in 1979 with completion of the advanced wastewater systems currently being planned. The quality of the Lower Savannah River will be increased even further with the completion of water pollution facilities for the American Cyanamid Company. Many other improvements less significant than these previously named will occur around the State within the next several years.

Non-point Source Pollution

Control of non-point source pollution was a low priority with the State Water Quality Control Section prior to 1975. During 1975, the Water Quality Control Section initiated a statewide non-point source pollution assessment. The assessment will be completed during the next two years and the State will establish priorities and control strategies for non-point sources as a part of the continuing planning process. The Erosion and Sedimentation Act passed during the 1975 session of the Georgia Legislature provides for the establishment and implementation of a statewide comprehensive soil erosion and sediment control program. The State Environmental Protection Division and local governments are given certain mandates to promulgate and enforce ordinances for the control of erosion and sedimentation. This will be an integral part of the State's control programs for non-point sources of water pollution.

Costs and Benefits

In 1975, $75.7 million were obligated by local, state, and federal governments for municipal wastewater projects in Georgia, thus satisfying about 7 percent of the $1.1 billion of needs projected in the 1974 National Needs Survey for improvements to wastewater treatment plants and construction of new interceptor sewers, force mains, and pumping stations. The 1974 needs estimates were for facilities to meet existing stream standards, but some of the existing standards are lower than those for fishing and swimming. The 1974 Needs Survey covers only capital costs for building municipal wastewater treatment facilities; it does not reflect municipal operating costs which were in the tens of millions of dollars during 1975 and which can only increase in the future. Therefore, the total costs of meeting the Federal goals will far exceed the estimates made in the Needs Survey.

It is estimated that Georgia's industries have expended more that $225 million since 1965 to reach the levels of treatment provided for industrial wastewaters today, and an additional $50 million will be spent by these industries to achieve BPT by 1977. If industries are required to upgrade treatment to BAT, it is estimated that they will have to spend an additional $200 to $250 million.

At this time, it is not possible to quantify the social and economic benefits of water pollution control programs already completed and to be accomplished in the future. It was learned in 1975 that fish were returning to areas of the Lower Savannah River where they had not been in many years. Successful fishing in the Conasauga River downstream from Dalton's wastewater discharge was also reported—a vast improvement over conditions five years ago. It will be difficult to quantify the benefits of improvements in fishing and recreation opportunities that will accrue throughout the State as a result of the present water quality control efforts, but they will continue to accrue. A method for quantifying benefits is needed.

Recommendations

The Congress should delay for at least 5 to 10 years the requirement for industries to reach BAT. The effects of current water pollution control programs should be seen before decisions are made requiring more treatment. The Congress should continue to provide a significant level of funding ($5-$7 billion per year) for the PL 92-500 construction grants program with a fair and equitable allocation formula for at least another five years, or it will be impossible for substantial additional progress to be made in Georgia toward making all waters meet fishable and swimmable criteria. The Federal grant share must continue at the 75 percent level to enable local governments to finance required improvements and establish the necessary operation and maintenance programs with local funds.

The 1977 deadline should be extended on a case-by-case basis for publicly owned systems as construction grants funds are made available. Also, the certification of states to administer the construction grants program should be authorized by the Congress with adequate financial support to enable the states to conduct an efficient and effective program. In addition, the combination of Step 2 and Step 3 grants into one grant would expedite the program.

APPENDIX A
Summary - Guam

Complete copies of the Guam 305(b) Report can be obtained from the State agency listed below:

Guam Environmental Protection Agency
Box 2999
Agana, Guam 96910

Summary

Guam's overall water quality changed little between the time of our first report to the Congress (April 1975) and this year's. Between May 20-22, 1976, Typhoon Pamela struck the Island with winds up to 190 mph. This storm was a mixed blessing vis-a-vis environmental impact. In near-shore reef areas and estuaries, sediments were washed ashore or further out to sea, thus 'cleaning' the waters and making them less turbid. However, expansion of eroded areas in southern Guam occured due to the heavy accompanying rains. In addition, the stripping of most of the Island's vegetation made these areas more fire prone, resulting in several extensive grass fires, particularly in the Umatac Area. The largest impact from a water quality point of view, however, may be the thrust the storm gave to the local construction and development industry due to the infusion of large amounts of Federal aid. Many of these future projects will no doubt carry with them the associated impacts of erosion and siltation and generation of polluted stormwater.

Bacterial pollution and heavy sediment loads continues to characterize Guam's central and southern rivers, particularly the Umatac, Asan, Agana, and Pago. Problems of uncontrolled sewage discharges from cesspools, pit privies, and direct drainage into rivers account for a large number of violations. The continued poor quality of the Pago River is attributable to the sporadic operation and maintenance of the Yona Sewage Treatment Plant and the poor location of its outfall.

Extensive clearing and grading, coupled with areas of natural erosion, have increased turbidity levels in some river basins. Although Islandwide permits for clearing and grading dropped considerably from 1974-5 because of the lull in construction activity, the erosional effects of the typhoon, both immediate and long-range, have offset this reduction.

The percentage of Island homes with improper sewage disposal or septic tank systems has declined somewhat due to the gradual elimination of substandard dwellings through urban renewal and a movement toward construction of permanent concrete dwellings by Island residents. Coordination between the Guam Environmental Protection Agency (GEPA) and the Federal Housing Administration has helped to check the number of new homes with improper sewage disposal systems. In addition, the increased activity in interceptor sewage construction in Mangilao, Chalan Pago/Ordot, Barrigada, and Maite will make sewers available to many more homes.

Although actual changes in water quality were not evident, several events have occured within the past year which may have a substantial beneficial impact on water quality in the future.

After several months of negotiation, on January 9, 1976 Gillham, Koebig and Koebig, consultants for the Government of Guam, were authorized to work on an Islandwide Wastewater Facilities Plan. This effort is the initial step in the provision of sewage collection lines, and treatment to Guam's southern villages, and the expansion and upgrading of existing lines in the north. Public hearings were held in March 1976 in the villages of Umatac and Merizo to present alternative plans for these villages. Additional hearings are scheduled for Inarajan and Talofofo in July and August 1976. The entire effort is due for completion by April 1, 1977.

On November 13, 1975, at the combined request of GEPA, Bureau of Planning, and the U.S. Geological Survey, and after a careful review of the available information, Governor Ricardo J. Bordallo requested that the Administrator, U.S. Environmental Protection Agency (EPA), designate the entire northern portion of Guam, stretching north from the southern boundaries of Chalan Pago and Ordot, under Section 1424(e) of the Safe Drinking Water Act, as our principal water supply source. Such designation by the EPA will result in the protection of our groundwaters from any Federal actions which could significantly impair their quality. Notice of the EPA's intent to designate our northern aquifer was published in the Federal Register on April 26, 1976.

In May 1975, the GEPA submitted an application to EPA for a 100 percent grant, under Section 208 of the Federal Water Pollution Control Act, for funds to perform an Islandwide water quality program to study the impact of, and determine methods to control, erosion, urban runoff, and land discharges of residential sewage. A major portion of the 208 program is developing public awareness of environmental problems and providing input to programs designed to curb them. The application was subsequently approved and, on May 13, 1976, a detailed work program was transmitted to the EPA specifying the objectives, manpower, training, and cost necessary to achieve the goals of the two-year program.

After three public hearings and four public GEPA Board of Directors' meetings, Guam's Revised Water Quality Standards were adopted on September 25, 1975. The Standards establish specific pollutant criteria for surface and potable water, new use classifications for Island waters (including conservation), and general effluent limitations for waste discharge. On March 29, 1976, the Standards were approved by the Federal Government.

In addition to the Water Quality Standards, Regulations for Well Drilling and Erosion Control were also adopted by the Agency's Board of Directors during 1975.

GEPA's Water Basin Planning Program, under Section 303(e) of the Federal Water Pollution Control Act, produced an overall Island water planning profile and a specific plan for most of northern Guam, classed as Segment A. The plan identified major water areas, types, and uses and the location and types of waste discharges affecting these uses. The Basin Planning Program will be incorporated into the 208 Comprehensive Water Quality Planning Program and a plan for controlling both point and non-point pollution will be developed by July 1, 1978.

Because so many long-range water quality programs were initiated in 1975, evaluation of their impact in regard to meeting the 1983 national goals cannot be determined. Guam's third Report to Congress will detail the impact of these new pollution control efforts.

APPENDIX A
Summary - State of Hawaii

Complete copies of the State of Hawaii 305(b) Report can be obtained from the State agency listed below:

Environmental Health Division
Department of Health
P.O. Box 3378
Honolulu, HI 96801

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Introduction and Summary of Extent of Water Pollution in Hawaii

Water Quality in the State of Hawaii was reported last year in a document prepared for the EPA and the Congress of the United States in fulfillment of Section 305(b) of PL 92-500. It presented a broad overview and assessment of major water quality problems, critical issues, and needed control actions as viewed by the State's water pollution control programs. The issues that were then addressed remain fundamentally unchanged in this year's analysis, in particular, with respect to non-point source pollution. This is still cited as the major concern of the State.

Considering the same fundamental issues and problems, it is appropriate in this 305(b) report to draw the same conclusions as follows:

1. All municipal point discharges are under the permit system committed to compliance schedules for application of best practicable technology currently available, but adherence to compliance schedules is dependent entirely upon availability of construction funds.
2. Almost all industrial point discharges from raw cane sugar factories have been eliminated by recycling wastewaters to sugarcane fields for irrigation. The exception is the non-irrigated plantations along the Hanakua Coast on the Island of Hawaii. The topography, climate, and cane cultivation and harvesting are unique factors which make the application of conventional technology ineffective and expensive for achieving water quality standards. Strict effluent limits based on water quality standards could incur costs high enough to disrupt economic health of these industries unless innovative waste management schemes are developed.
3. Non-point sources of discharges such as storm runoff, soil erosion, seepage from individual sewage disposal systems, and agricultural operations, are a major class of discharges affecting water quality. Control technology and regulatory programs are considered to be related to land use, for which guidelines are as yet undeveloped.
4. Two major shellfish growing areas are now subject to contamination by sewage effluents and urban runoff. Plans have been developed for diversion of sewage effluents to other disposal sites. Further regulatory controls must be developed to safeguard against contamination from pesticides and heavy metals in urban runoff.
5. Regulations governing the design, construction, installation, operation, and maintenance of *sewage treatment and disposal systems* (public and private) are prescribed in Chapter 38, Public Health Regulations, Department of Health, State of Hawaii. Minimum standards governing treatment and disposal systems have been in the process of revision.
6. Point source discharges are controlled under the federally mandated National Pollutant Discharge Elimination System (NPDES) delegated to the State on November 28, 1974, under which any discharge into State waters requires a permit. Permits have been issued to 95 percent of the major and minor discharges in the State.
7. With progress toward the goal of "zero-discharge," *subsurface emplacement of effluents* and deep ocean outfalls are becoming more prevalent. Subsurface emplacement of effluents must be controlled to protect groundwaters. A permit system for the discharge of effluents into injection wells is being developed.
8. As point sources of pollution are brought under control, the major emphasis in water pollution will shift to control of the pollution that arises from dispersed areas. The major *nonpoint sources of pollution* in Hawaii are runoff: Urban, agricultural, and construction.
9. *Physical controls* should include:
   Use of impoundments or catch basins to reduce the rate and amount of runoff;
   Watershed treatment to reduce the rate and amount of runoff; and
   Retention of open spaces within the urban areas to reduce the total amount of runoff.
10. *Environmental policies* should consist of:
    Procedures to control urban litter and to enforce general sanitary conditions;
    Strict performance standards controlling grading and exposing bare soil during construction; and
    Regulations to control the open storage and drainage in commercial and industrial areas.
11. *Zoning* has has been and will continue to be used as the primary control over the location, density, and direction or urban growth. With little modification, these same ordinances can be used to implement water quality-related land use plans.

APPENDIX A
Summary - State of Idaho

Complete copies of the State of Idaho 305(b) Report can be obtained from the State agency listed below:

Department of Health and Welfare
Statehouse
Boise, ID 83720

Summary

This report updates the Water Year 1974 Water Quality Status Report.

Water quality data presented indicate that significant reductions in municipal and industrial point source pollutant loads over the past few years have had a measurable effect in some streams. It is also apparent that non-point source pollutant loadings have a major impact on stream water quality so that water quality standards and goals may not be achieved for many streams until such sources are considerably reduced.

The NPDES permit program is functioning well in Idaho with good progress being made in attaining compliance with the 1977 treatment requirements.

Considerable progress has been made in developing a non-point source pollution control program. The first non-point source pollution control strategy for Idaho was developed in March 1976. Agriculture (including irrigated and non-irrigated croplands, and range and dry pasture) and silviculture are considered to have the most significant effect on water quality of all land use activities. The extent of non-point pollution sources is not expected to decrease without uniform statewide application of sound management practices.

The recommendations for revising Public Law 92-500 by the National Commission on Water Quality are generally supported with some few exceptions noted in the report. There are other recommendations pertaining to Sections 208, 305(b) and 404 of the Act, and financing of agricultural pollution control facilities.

Recommendations on Public Law 92-500

The following discussion is based on the "Report to the Congress by the National Commission on Water Quality" dated March 18, 1976 and specifically the section titled "Recommendations (Summary)" (see Appendix A-1 to this appendix).

The 1977 Requirements

- **Recommendation No. I**

A. There is a definite need for authority to grant extensions of time to municipal, industrial and agricultrual dischargers to meet the 1977 requirements on a case-by-case basis. Such time extensions should not extend beyond July 1, 1983.

B. Congress should only authorize a deferral of the 1977 requirements on a case-by-case basis and not, as suggested, a waiving or modification of the 1977 requirements. It appears that applications for waivers or modifications on a case-by-case basis could result in an administrative nightmare for the EPA.

C. Congress should provide authority for waiving, deferral, or modification of the 1977 requirements on a category-by-category basis, particularly for existing publicly-owned oxidation ponds and lagoons and deminimus situations. However, the States should be provided the authority to require the application of the 1977 requirements on a case-by-case basis within each category, if needed, to meet water quality standards.

The 1983 Goals and Requirements

- **Recommendation No. II**

A. The 1983 goal of fishable, swimmable waters must be maintained.

B. Congress should postpone the deadline for implementation of the 1983 requirements until: (1) Non-point source control measures (including irrigation return flows) are implemented; (2) the 1977 requirements are implemented; and (3) the results of these measures are documented by a complete assessment of water quality improvements achieved. Additional Federal funds should be provided to the States so that a complete assessment may be made of water quality improvements. After these three criteria have been completed, a new Commission, similar to the National Commission on Water Quality, should evaluate the progress made and make a determination as to whether uniform applicaton of more stringent effluent limitations than the 1977 requirements is justified and necessary for attainment of national water quality goals.

Decentralization

- **Recomendation No. III**

Congress should authorize the EPA Administrator to issue certification to any State to exercise full authority and responsibility for planning and for administration of the discharge permit and construction grants programs. However, many State pollution control agencies would probably not be able to apply for such certification unless adequate Federal or State resources were provided to administer the programs. When such certification is made, the EPA staff should be reduced and EPA should assume a more secondary role to the States. The EPA should then concentrate on formulating criteria review, allocating Federal resources, research and development, and technical assistance.

In addition, it is strongly recommended that the current nation-wide organization of the EPA be modified and patterned after the more progressive EPA Region X. The EPA's ten national regions should be decentralized in order to strengthen individual State programs. EPA Region X has an operations office in each State within the region. Since this concept was implemented, the interrelationship of State/EPA has improved tremendously in Idaho.

Federal Financial Assistance

- **Recommendation No. IV**

Congress should provide Federal grants for constructing publicly-owned treatment works by authorizing funding of the program at $5 billion per year for at least ten years.

Elimination of the Discharge of Pollutants and Research and Development Needs

- **Recommendation No. V**

A. Congress should redefine the goal of elimination of discharge of pollutants by 1985 and, instead, stress conservation and reuse of resources. When practical, the State should strive for elimination of pollutant discharges into the nation's waters.

B. Congress should provide adequate financing to accelerate *practical* research directed toward developing and demonstrating promised techniques for recycling, reuse, land application and other resource-conserving options for waste management. Where possible, State water pollution control agency administration of the research programs should be emphasized.

C. Congress should encourage research on toxic pollutants and their effects.

D. No comment.

E. See Paragraph B above.

Irrigated Agriculture

- **Recommendation No. VI**

A. Congress should authorize flexibility in the application of control requirements in this category of discharge and recognize the need for the development of applying resource systems on a site specific basis. Identified problems must be resolved within a reasonable period of time in order to meet water quality goals.

B. No comment.

- **Other Recommendations**

1. Section 305(b) should be revised to require State water quality status reports bi-annually rather than annually.
2. Section 404 should be revised to allow State operation of dredge and fill permit system where a State already has adequate authority to regulate such discharges.
3. Congress should consider the provision of Federal funding to State and local planning agencies where necessary to implement Section 208 water quality management plans.
4. Congress should consider developing a financing program which would provide low interest loans to agriculture interests on a high-priority basis where structural measures are needed to control pollutant discharges.

APPENDIX A-1
RECOMMENDATIONS (SUMMARY)

THE 1977 REQUIREMENTS

I. The Commission recommends that

A. Congress authorize granting extensions of time to municipal, industrial and agricultural dischargers to meet the 1977 requirements on a case-by-case basis where:

1. The discharger can demonstrate reasonable progress toward compliance with the July 1, 1977 deadline; or

2. Lack of Federal construction grant funds has caused delay; or

3. The discharger can demonstrate other good and sufficient cause;

Provided that in no case shall such extensions of time extend beyond (a specified date such as September 30, 1980) or until the cause for delay has been removed.

B. Congress authorize waiving, deferral or modification of the 1977 requirements on a case-by-case basis where the discharger demonstrates to the satisfaction of the Administrator (or a state administrator where a state has been certified) that adverse environmental impacts of such action will be minimal or nonexistent, or that the capital or operation and maintenance costs are disproportionate to projected environmental gains.

C. Congress authorize waiving, deferral, or modification of the 1977 requirements on a category-by-category basis for near shore ocean discharges of publicly owned treatment works, pretreatment requirements, existing publicly owned oxidation ponds and lagoons, and de minimus situation where the Administrator determines that the adverse environmental impacts of such action will be minimal or nonexistant, or that the capital or operating and maintenance costs are disproportionate to projected environmental gains.

THE 1983 GOAL AND REQUIREMENTS

II. The Commission recommends that

A. Congress retain the national goal, "... that whenever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;"

B. Congress postpone the deadline by which municipal, agricultural and industrial discharges shall be required to meet the 1983 requirements from July 1, 1983 to (a date not less than five and no more than ten years after 1983) provided the following interim actions are assured:

1. Effluent limitations for 1977 are reviewed periodically and revised, if appropriate, to reflect advances in practicable control technology;

2. Periodically review and aggressively enforce higher levels of treatment than required by the 1977 effluent limitations where the 1977 requirements will not achieve Federally approved State water quality standards and where more stringent limitations will significantly help in achieving water quality standards;

3. Review and alter new source performance standards periodically as technology is perfected to ensure a high level of control or treatment of new pollutant sources;

4. a. Where possible, toxic pollutants in toxic concentrations shall be controlled in applicable effluent limitations and permits.

b. Effluent limitations based on technology to eliminate the discharge of toxic pollutants in toxic concentrations into the nation's waters shall be implemented as soon as possible but no later than October 1, 1980;

5. a. Apply control or treatment measures to combined storm and sanitary sewer flows and to urban stormwater flows when these measures are cost effective and will significantly help in achieving water quality standards.

b. Control or treatment measures shall be applied to agricultural and non-point discharges when these measures are cost effective and will significantly help in achieving water quality standards.

For these measures, Congress could utilize the capabilities of existing institutions and their resources, and may wish to consider additional Federal resources to carry out the necessary programs;

6. An on-going national assessment of the quality of the nation's waters shall be undertaken to determine progress toward water quality goals and objectives and the progress periodically reported to the Congress; and

7. No later than 1985 a Commission similar to the National Commission on Water Quality shall evaluate progress toward these goals and make appropriate recommendations, at which time Congress may consider whether uniform application of more stringent effluent limitations that the 1977 requirements is justified and desirable.

DECENTRALIZATION

III. The Commission recommends that

Congress authorize certification, upon application, to any state to exercise full authority and responsibility for planning, and for administration of the discharge permit and construction grant program, provided:

A. A statewide water quality plan and program is approved at the time of certification.

B. The state demonstrates

1. It has the appropriate statutory authority and directions, manpower and appropriations, administrative or judicial penalties and remedies; and

2. It meets such other qualifications as the Congress may determine necessary to perform such functions.

C. That certification be for a period of five or more years renewable after that based on progress toward improved water quality, and that the state agrees the certification may be withdrawn, after public hearing, on a showing of unsatisfactory progress, but that certification shall continue in force unless and until it is withdrawn by the Administrator.

As the certification process proceeds, the Federal role in the national water quality program should be that of formulation of criteria review and approval of state programs, allocation of Federal resources, research and development and technical assistance, review of state progress and performance and more detailed supervision of those functions not certified to the states.

FEDERAL FINANCIAL ASSISTANCE

IV. The Commission recommends that

Congress provide stability for the program of Federal grants for the construction of publicly owned control or treatment works by authorizing and indicating its intent to fund the progran at (not less that $5 billion nor more than $10 billion per year) for a fixed term of years (not less than five nor more than ten) at 75 percent of the cost of construction, provided that:

A. Priorities for the award of grants for eligible publicly owned treatment works within a state shall be established by the state provided that the ordering of priorities shall be based unon cost effectiveness and upon the ability of a project to contribute substantially toward the "goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water."

B. In pursuit of the objective of ultimate self-sufficiency for the construction, operation and maintenance of publicly owned treatment works, the Congress reexamine the rationale and the actual performance to date of the user charge, industrial cost recovery, and pretreatment provisions in the Act.

ELIMINATION OF THE DISCHARGE OF POLLUTANTS AND RESEARCH AND DEVELOPMENT NEEDS

V. The Commission recommends that

A. The Congress redefine the goal of the elimination of discharge of pollutants by 1985 to stress conservation and reuse of resources while striving to achieve the objective of restoring and maintaining "... the chemical, physical, and biological integrity of the Nation's waters."

B. The Congress re-enforce the mandate and provide adequate financing to accelerate research directed toward the development and demonstration of promising techniques for recycling, reuse, land application and other resource-conserving options for waste management, and that the Congress further encourage:

1. Increasing efforts by industry, agriculture and the public section, directed toward the development, refinement and application of sound control technologies and treatment options that conserve and reuse water resources of the production process, and water-borne nutrients in human and animal waste;
2. Intensified research focused on the development and application of more efficient and cost effective alternative for the control and treatment of separate and combined sewer overflows; and
3. Appropriate use of the resulting waste management techniques, through an Environmental Protection Agency-sponsored technical assistance program, to advise communities, industries and agricultural dischargers on the availability and adaptability of cost effective and environmentally sound treatment options to meet the needs of these dischargers.

C. The Congress should encourage accelerated research on the identification and measurement of toxic pollutants and their effects, sources of toxic pollutants in the environment and the nation's waters, the fate of toxic pollutants in the aquatic environment and their impacts upon organisms and upon human health, and the identification of sound control technologies for the elimination of toxic pollutants.

D. Expanded efforts on the collection, evaluation and utilization of data on pollutant discharges and permit compliance, and their relationship to the measurement of improvements in water quality should be initiated at once.

E. Congress should vest leadership for the above recommended research and development programs with the Environmental Protection Agency, while encouraging such research at other levels of government and within the private sector.

IRRIGATED AGRICULTURE

VI. The Commission recommends that

A. The Congress recognize the variations in the physical, hydrological, institutional and economic characteristics of irrigated agricultural activities and authorize flexibility in the application of control or treatment requirements in this category of discharge, including discretionary authority to exempt certain dischargers to categories of dischargers from monitoring and permit requirements, provided that:

1. a. An assessment of the irrigated territory to the United States be prepared identifying and classifying by basin and sub-basin and severity of pollution problems, areas where the practice of irrigated agriculture along or in conjuntion with natural conditions and other consumptive water uses may impact water quality through changes in salinity, sediment, nutrient or pesticide concentrations or through other deleterious effects; and

   b. Physical, hydrologic, economic and institutional criteria for exemption from permitting and monitoring requirements are developed; or
2. The water quality plan and program of a state, as well as areawide waste management plans, contain an acceptable strategy for mitigating the effects of irrigated agricultural discharges including a program for permitting and monitoring, as necessary, to achieve and maintain the water quality standards in a state or basin.

B. Congress explore and, where appropriate, support salinity alleviation projects to control or reduce naturally contributed salts to the nation's waters.

APPENDIX A
Summary - State of Illinois

Complete copies of the State of Illinois 305(b) Report can be obtained from the State agency listed below:

Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706

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Executive Summary

This report has been prepared by the Illinois Environmental Protection Agency (IEPA) in satisfaction of the requirements of Section 305(b).

Current Water Quality and Recent Trends

Water quality sample data collected by the IEPA during 1975 at some 550 sampling stations located throughout Illinois is summarized for each of the 123 segments of 14 major river basins located in Illinois. These sample data were compared with corresponding water quality standards, and a tabulation of parameters for which one or more violations of a water quality standard was observed during 1975. While nearly every water quality parameter for which a numerical standard exists was violated somewhere in the State during 1975, the most widespread parameter violations were for fecal coliform, total iron, ammonia nitrogen, copper, dissolved oxygen, lead, manganese, and total phosphorous. By far the leading parameter in terms of number of stations showing violations was fecal coliform—more than 98 percent of the stations sampled showed at least one violation.

A water quality index based on chemical sample data has been defined and correlated with findings of field biological studies. This index has been computed for each sampling station using available data for the year 1971 through 1975 so as to provide an analysis of overall water quality trends for the past five years. Viewed statewide, for 538 stations where comparable data for 1972 and 1975 were available, conditions as measured by the water quality index improved at 93 stations and deteriorated at 50 stations. No significant change occured at 379 stations. The net improvement is attributed largely to the upgrading of sewage treatment facilities which handle sanitary sewage from municipalities.

Surveys of biological communities in some 140 stream reaches conducted by IEPA biologists since 1968 are summarized. A large majority of these surveys revealed at least localized effects on the aquatic habitat by some form of pollution. Most of these effects are identifiable to some degree with known point sources, but there are many instances where non-point sources are at least partially to blame for degraded conditions.

Water quality studies conducted by other individuals and agencies in recent years are summarized by the IEPA.

A report by Nienkerk and Flemal analyzes the observed values of various dissolved solids from a regional distribution viewpoint, and thereby points out the importance of both geology and regional land use differences in determining so-called "background" concentrations of minerals in surface waters.

The U.S. Environmental Protection Agency's National Eutrophication Survey has resulted in "Working Papers" for 31 lakes studied in Illinois. These studies have led to the conclusion that Illinois lakes which are sustained by impoundment of surface runoff will receive sufficient nutrients from non-point sources to become eutrophic very quickly. Only one of the 31 lakes studied—Cedar Lake in Lake County—was not classified as eutrophic, and it is one of the few lakes in the State whose level is maintained principally by precipitation and groundwater inflow.

A study by Mathis of the Illinois River and some of its tributaries indicates that higher levels of several heavy metals and other minerals are found in the bottom sediments of the Illinois River itself than in three of its tributaries which do not receive industrial discharges. Bottom-dwelling clams and worms showed higher tissue concentrations of these same chemical constituents than fishes. It was concluded that bottom sediments act as a "sink" for heavy metals.

Bulletin 56 of the Illinois State Water Survey, "Quality of Surface Water in Illinois, 1966-1971," summarizes water quality data collected by the Survey at U.S. Geological Survey stream gaging stations. It is noted that maximum total inorganic phosphorous values range from 0.63 mg/l to 4.59 mg/l at the various stations. This can be compared roughly with the current Illinois water quality standard of 0.05 mg/l for total phosphorus in lakes or streams at the point of entry to a lake. It may be concluded that the current water quality standard for total phosphorous is being achieved consistently almost nowhere.

The "Illinois Soil and Water Conservation Needs Inventory," published in 1970, indicates that annual average soil loss due to erosion by county ranges from 8 to about 11 tons per acre. It is estimated that about 61.6 percent of the acreage of Illinois is in need of some form of soil conservation measure.

A report entitled "Ohio River Main Stem Assessment of 1975 and Future Water Quality Conditions" by the Ohio River Valley Water Sanitation Commission presents a summary of water quality violations on that stream. The Illinois water quality standards violated at some time during the year were phenols, total iron, manganese, dissolved oxygen, and fecal coliform. Combined and storm sewer discharges were blamed for frequent and extensive violations of the recreational use standards for fecal coliform. The importance of non-point sources of pollution as a major determinant of water quality after 1977 point source controls are operational was cited.

An unpublished IEPA report summarizing results of analyses of fish from several areas of the State for pesticides and polychlorinated biphenyls disclosed the following facts: Of the three pesticides analyzed—heptachlor epoxide, dieldrin, and total DDT—only dieldrin was found to be present at levels approaching or exceeding the FDA tolerance level (except for a single instance for heptachlor epoxide in a large carp taken from the Illinois River). No values of PCB's in excess of the FDA limit were found, although many values in excess of the analytical detection limit were found. (No fish from Lake Michigan, where PCB problems have received wide publicity, were included in this study.) Thus, based on the limited data available, the most serious problem with these four persistent chemicals other than in Lake Michigan is that of high dieldrin levels which have beeen found in many locations.

Water Quality Goals and Programs

Water quality analyses made during development of Phase I water quality management plans have identified those water quality parameters contained in existing Illinois water quality standards for 1977 for which violations are expected to continue following implementation of currently mandated point source controls. For the most part, the remaining violations are expected to result from non-point sources.

The current Illinois water quality standards are presented. These standards are considered to be generally consistent with the 1983 national goals that wherever attainable, water quality will be achieved which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water. It is recognized that some revision of the current water quality standards will be required, however, in order to better reflect background levels of some parameters.

Parameters for which continuing violations of current standards are projected are fecal coliform, manganese, boron, total iron, copper, mercuty, total dissolved solids, chlorides, lead, zinc, sulfates, pH, cadmium, cyanide, nickel, total phosphorus, silver, dissolved oxygen, and nitrates.

Phase II water quality management planning—to be conducted between July 1, 1976 and November 1, 1978—will identify the additional controls, especially "best management practices" for non-point sources, which will be required to achieve the 1983 goals. Needed changes to current water quality standards will also be identified in that time period.

Costs and Benefits

The costs for control of municipal pollutant sources as developed for the 1974 Survey of Needs for Municipal Wastewater Treatment Facilities were updated by application of a 1.41 multiplier. The resulting estimate of the total cost of correcting existing problems from publicly owned sources and providing capacity for the next twenty years is $12.2 billion. Of this total, $3.1 billion is for control of stormwater. The largest category of need is $4.5 billion to correct combined sewer overflows. Slightly more that $3 billion is needed for improved treatment facilities for dry weather flows.

For industrial wastes, it is estimated that about $1.2 billion in total capital costs are required to bring industrial dischargers from 1973 levels of performance to compliance with 1983 goals. This will entail an annual outlay of $281 million for both capital and operating costs.

Only crude estimates of a few categories of non-point source control costs can be made at this time. Elimination of abandoned coal mine drainage problems was estimated to cost some $346 million at 1974 prices. The 1970 Conservation Needs Inventory estimated that 61.6 percent of the acreage of Illinois needs conservation measures, but no dollar cost is available.

No effort is made to quantify for Illinois or individuals the benefits to be gained from achievement of the 1983 water quality goals. Numerous qualitative assessments of these benefits have been compiled previously.

Non-point Sources

A brief summary of the nature and extent of various categories of non-point sources of pollution is provided.

Agricultural non-point sources, or agricultural runoff, is the most important category in terms of the number of stream miles affected. Storm runoff from agricultural land can carry oxygen-demanding organic matter, soil particles and minerals leached from the soil, fecal coliform bacteria, pesticides, fertilizers, and other pollutants into the streams. The key to reducing the movement of many of these materials is believed to be the establishment of effective soil erosion control practices. In addition, reduction of erosion and subsequent sedimentation will reduce the rate of siltation of downstream reservoirs.

Silviculture, i. e., timber operations, is not considered to be a major source of degraded water quality in Illinois, even though it is a serious problem in other States.

Coal mining—both underground and surface—is an important industry in Illinois. In terms of the severity of the pollution which occurs as a result of drainage from refuse piles, spoil banks, and other mine-related land features it is the most important non-point pollutant source. Exposed pyrites form sulfuric acid upon contact with air and water; this acid not only is toxic when it directly contacts aquatic life, but it also leaches and dissolves heavy metals and other minerals from the soil it contacts, thereby generating additional toxic components. Some 415 miles of creeks and rivers, plus their minor feeder tributaties, have been affected by mine drainage in Illinois. Current regulations are not considered to be appreciably successful in controlling stream degradation by new mining activities, and almost no control exists over problems resulting from abandoned mines.

Stream degradation due to construction activity is a widespread, if not particularly severe, problem in Illinois. Erosion and subsequent sedimentation frequently destroys aquatic habitats in the vicinity of construction projects. More effective erosion control practices are needed.

It has been estimated that some 4,000 miles of interior streams of Illinois have been channelized in order to improve drainage from adjacent farm lands. Such channelization has a profound adverse effect on the water quality of these streams by increasing turbidity, dissolved solids concentrations, and stream temperatures, and decreasing dissolved oxygen.

Greater consideration should be given to the effects on water quality and the aquatic habitat of hydrologic-hydrographic modifications.

Urban storm runoff affects water quality by carrying into streams organic matter, lead and petroleum residues from automobile exhaust, salts and other street de-icing materials, and other pollutants washed from streets, parking areas, and rooftops. In urban areas served by combined sewers, it is difficult to separate the effects of washoff from those of sanitary wastes which flow into streams during storm events.

Residual wastes from wastewater treatment facilities appear not to be a major source of water quality degradation currently. Existing control programs are adequately regulating residual waste disposal.

Saltwater intrusion by seawater into fresh water aquifers is not a problem in Illinois. Some problems do occur, however, with chlorides from highway de-icing, oil well brine disposal, and scattered natural salt deposits.

A new identified non-point source of pollution which is of particular concern relative to Lake Michigan, is that of fallout or washout from polluted air.

Recommendations

1. Continuation of the Federal construction grant program for several years into the future is essential if control of pollution due to municipal wastewater is to be achieved. As a minimum, construction of a minimum of $1.65 billion of eligible projects should be initiated during the period October 1, 1976 through September 30, 1980.

2. Improved management techniques and controls need to be implemented to reduce the effects of runoff from agricultural land, construction sites, mining areas, and urban centers.

3. Existing point source controls should be evaluated and revisions made to increase their effectiveness. NPDES permits should be issued to reflect appropriate effluent limits and monitoring requirements as dictated by continuing water quality violations.

4. Additional controls and the use of more effective management techniques are necessary to reduce the pollutional effects of livestock operations.

5. Control of combined sewer overflows, elimination of sanitary sewer overflows, and the reduction of the pollutional effects of storm drainage are needed to meet water quality goals as currently expressed.

6. The segment water quality analyses should be reviewed to determine the desirablity of relocating sampling stations so that monitoring can be more effective where needed and reduced where no need is apparent.

7. Ongoing review and revision of water quality standards is recommended in order to add standards for new parameters, change values for existing parameters, and eliminate those values which prove to be of little or no significance.

8. Continued efforts to achieve better operation of treatment facilities and monitoring of pollutant point sources should be undertaken.

APPENDIX A
Summary - State of Indiana

Complete copies of the State of Indiana 305(b) Report can be obtained from the State agency listed below:

Water Pollution Control Division
Indiana State Board of Health
1330 West Michigan Street
Indianapolis, IN 46206

Summary

Although virtually all waters of the State of Indiana have been and are being influenced to some extent by activities of man, localized water quality problems are known to result from natural causes as well. The "natural" or background concentration of various water quality parameters in a given watershed are influenced by erosion of prevailing soil types and weathering of exposed rock outcrops. On the basis of available data, it appears that these "natural" or background levels of heavy metals, nutrients and other substances may vary from streams of one physiographic zone to another, and in some instances in streams in a single watershed.

This makes it extremely difficult to establish uniform numerical water quality criteria for the entire State. This is particularly true in the case of trace metals where criteria recommended by the U.S. Environmental Protection Agency (EPA) are exceptionally low.

In 1943, the Indiana General Assembly enacted a Stream Pollution Control Law (IC 1971, 13-1-3) which provided for the formation of a seven member Stream Pollution Control Board. This Board was charged with the responsibility of abating or preventing pollution of the waters of the State. The Law gave the Board the legal authority to accomplish this difficult task.

A relatively short time after its formation, the Board adopted Regulation SPC-1 which established water quality criteria for all recognized uses. This regulation provided the Board with a necessary enforcement tool until 1967 when it was first revised. Since its formation, the Board has initiated nearly 500 enforcement actions prior to December 1, 1974, to compel violators to come into compliance with its regulations.

Voluntary as well as forced compliance with provisions of regulations of the Board have resulted in the improvement of hundreds of stream miles and a number of lakes.

A review of Part 1 of this report will reveal that the State of Indiana has through the years established on its on initiative, many programs subsequently required by the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) and regulations promulgated by the EPA as a result of the Act.

Other laws enacted by the Indiana General Assembly but enforced by the Stream Pollution Control Board, have had a significant impact on water quality. Among these are the Indiana Confined Feeding law and the Indiana Phosphorous Detergent Law.

In 1957, a fixed station water quality monitoring program was initiated with a network of 49 stations on major waterways throughout the State. These were sampled bi-weekly. Since 1957, the network has been expanded to include 95 stations and the parameter coverage has been increased. However, these stations are established at bridges and waterworks intakes, and are not always located at points which would indicate the extent of improvement that has resulted from past water pollution abatement program of the Board which have brought about significant improvement in localized areas of major streams or their tributaries.

In addition to the fixed station water quality monitoring program, representatives of the Board have conducted intensive surveys of wastewater dischargers for more than 30 years. Spills of oil and hazardous materials, fish kills, and pollution complaints have also been investigated.

Fifteen years of data from Indiana's Fixed Station Water Quality Monitoring Program have been summarized in an attempt to describe past conditions and have been supplemented with results from recent intensive segment surveys to illustrate current water quality conditions. Several general trends are apparent from these analyses.

Nitrate and chloride levels have increased steadily over the past fifteen years at most stations while temperature, turbidity, and pH values remained fairly constant. Coliform bacteria and five-day biochemical oxygen demand (BOD_5) data indicate few State-wide trends although definite improvements have been observed in several areas of the State. Dissolved oxygen concentrations, especially minimum values, have risen significantly over the past fifteen years in those areas. In addition, dissolved oxygen concentrations have been maintained or improved in most of the other areas of the State.

Over the past two years, stream $BOD\text{-}NH_3\text{--}DO$ modeling and waste load allocations have been completed for the Grand Calumet River and Indiana Harbor Canal, East Branch of the Little Calumet River, Wabash River (from Lafayette to Riverview), White River (from Winchester to Martinsveille), Maumee River, and the Middle Mississinewa River. In addition, thermal models have been completed for reaches of the Wabash and White Rivers.

The 1974 Needs Survey for Municipal Wastewater Treatment Facilities concluded that the State of Indiana needed approximately $3 billion for the construction of new municipal sewage treatment plants and improvement of existing municipal facilities. This excludes the $2.4 billion for treatment and control of stormwater overflow. This indicates that at least $5.4 billion will be needed for municipal projects required to meet the 1977-1983 goals.

Experience has clearly indicated that few, if any, municipalities will proceed with construction of needed facilities without a construction grant. Attempts to enforce Board orders for such construction in the courts have occasionally failed, due to adverse decisions by sympathetic judges. Therefore, it appears that the ability to meet 1977-1983 goals will depend upon continued and increased Federal funding of the municipal construction grants program.

An Industrial Cost Survey was conducted in 1975 for approximately one-third of the industries in the State, who had, at that time, been issued NPDES permits. These industries were contacted and asked to answer a short questionnaire. Completed questionnaires were received from 64 percent of the industries surveyed. Looking at combined expanded totals for the State over the last two years, industries have spent an estimated $1.4 billion for water pollution abatement or control. The expanded total for the next two years to reach the 1977-1983 limits was found to be approximately $1.14 billion.

Despite the expenditure of these funds by municipalities and industries, it may be impossible to meet the PL 92-500 goal of making all waters swimmable due to natural sources of coliform bacteria.

The PL 92-500 goal of requiring no discharge of pollutants by 1985 appears to be not only unattainable but unwise for numerous reasons. It is recommended that this goal be abandoned.

The ability of the Indiana Stream Pollution Control Board to fully implement programs required by EPA regulations promulgated under the authority granted by PL 92-500 will largely depend upon the extent to which the Indiana General Assembly and the EPA provides necessary funding.

APPENDIX A

Summary - State of Kansas

Complete copies of the State of Kansas 305(b) Report can be obtained from the State agency listed below:

Division of Environment
Department of Health and Environment
Topeka, KS 66620

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Summary

This section is a summary of the various discussions given in the succeeding sections of this report. These discussions, in turn, summarize the water quality information given in the tables at the end of the report. The following topics are presented as an inventory of the current water quality situation in Kansas.

Point-source Program

The status of the National Pollutant Discharge Elimination System program for Kansas as of January 1, 1976, and the status of statewide compliance with the 1977 and 1983 treatment requirements of PL 92-500 as of January 1, 1976, are as follows.

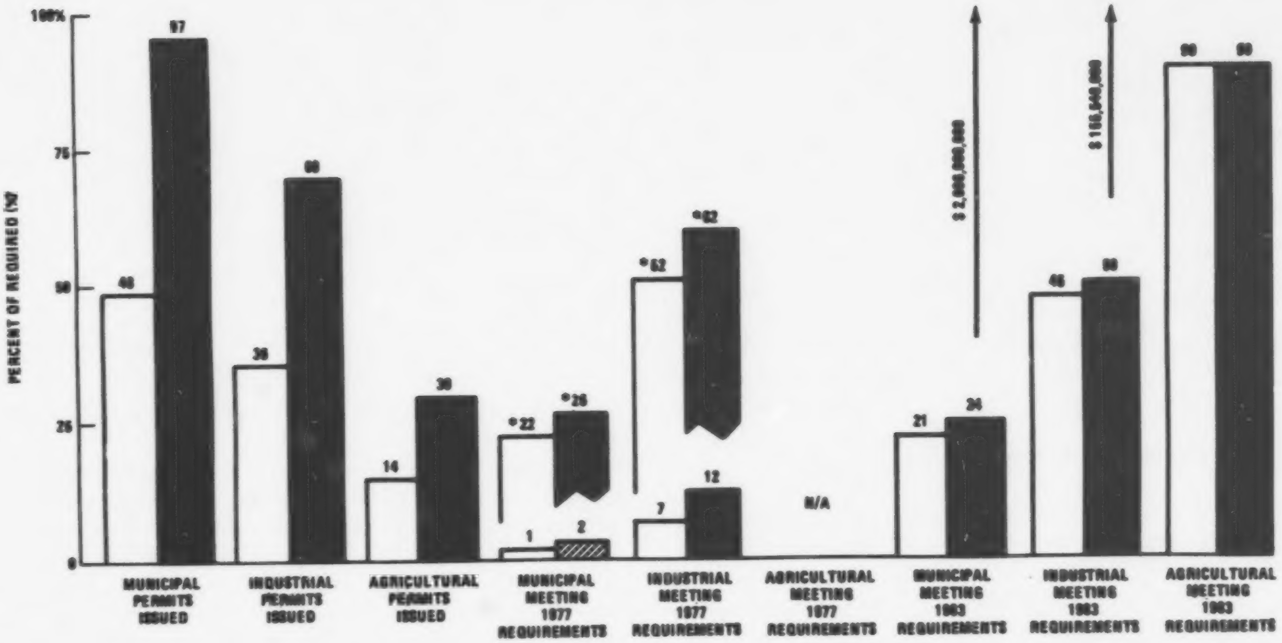
	Municipal point sources	Industrial point sources	Agricultural point sources
Total number of sources	512	342	2,348
Number of NPDES permits issued/required	376/386	216/313	186/628
Facilities in compliance 1977 requirements	8	40	–
Facilities in compliance 1983 requirements	125	173	2,118

Figure 1 is a graphical comparison of the status of compliance in 1975 with 1974.

Achieving the treatment requirements of PL 92-500 will involve the following areas of implementation:

1. Constructing secondary treatment facilities for 30 municipal plants still providing primary treatment.
2. Upgrading 337 municipal treatment plants to comply with currently defined effluent limitations. Because of the construction program required, the July 1, 1977 compliance date cannot be met by all dischargers.
3. Constructing 20 industrial treatment plants and upgrading 173 industrial treatment plants to comply with currently defined limitations.
4. Constructing waste control facilities for 230 feedlots.

FIGURE 1
SUMMARY OF NPDES PERMIT ISSUANCE AND WASTE TREATMENT COMPLIANCE
(As of January 1, 1976)



* INCLUDING THOSE MEETING 1983 REQUIREMENTS.

Non-point Source Evaluation

No specific non-point source control programs have been implemented to date, but some non-point source control has been accomplished through other governmental or voluntary programs. Six non-point source categories are of present or potential importance in Kansas in terms of water quality influence: Mineral inflow, rural runoff, irrigation return flow, mine drainage, urban runoff, and construction activities. The current evaluation of non-point source categories yields the following relative ranking of sources in terms of overall water quality significance and feasibility of control:

Non-point category	Present or potential water quality significance	Feasibility of major control
Mineral inflow	1	6
Rural runoff	2	3
Irrigation return flow	3	4
Urban runoff	4	2
Mine drainage	5	5
Construction activities	6	1

Control strategies for non-point source categories will receive in-depth evaluation in the state's River Basin Water Quality Management Plans, Phase II, scheduled for completion in November, 1978. Several specific investigations are now underway.

Surveillance Network

The Kansas water quality surveillance network has gathered extensive water quality information from as far back as the 1890's. Major revisions in the network have enlarged the scope of data collection since that time. The network underwent an extensive upgrading in 1975 with the State assuming responsibility for all water data collection and analysis, part of which had been shared with the U.S. Geological Survey (USGS). In addition to the regular network, the Division cooperates with the USGS in monitoring groundwater quality, conducts intensive surveys of specific river basins, monitors eight special projects and conducts special investigations of water quality problem areas.

Existing Water Quality

Long-term averages of water quality data from major rivers in Kansas yield the following general characterization: Turbid streams, moderately mineralized, well buffered, with good oxygen characteristics, low organic loading, high nutrient levels, and high bacterial levels. Water quality trends since 1967 on eight major Kansas rivers indicate that 72 key parametric averages have shown water quality improvement or no significant change, and 18 key parametric averages have shown water quality deterioration, as summarized below:

1967 - 1974 Water quality trend at nine major locations (monthly avgs.)	Dissolved oxygen	Biochemical oxygen demand	Temperature	pH	Turbidity	Fecal coliform	Ammonia	Total phosphate	Chloride	Sulfate	Total trends
Water quality improvement	-	6	1	-	7	9	5	6	1	1	36
No significant change	9	2	6	9	-	-	3	1	2	4	36
Water quality deterioration	-	1	2	-	2	-	1	2	6	4	18

Figure 2 shows these parametric trends at each of the nine river locations.

Water quality in Kansas streams in the last two decades has been primarily influenced by non-point sources, point source contributions having had their greatest impact during the period of the 1930's through the 1950's. At present, instream quality is determined almost entirely by flow regime. During low-flow periods, the most significant quality influence is the entrance of mineral inflow from natural sources. During high-flow periods, most Kansas surface waters display their poorest quality, with significant increases in BOD, nutrients, bacterial numbers, and turbidity from non-point source contributions. Figure 3 shows the influence of non-point runoff for several of these key parameters.

FIGURE 2
WATER QUALITY TRENDS IN MAJOR KANSAS RIVERS
(1967—1976)

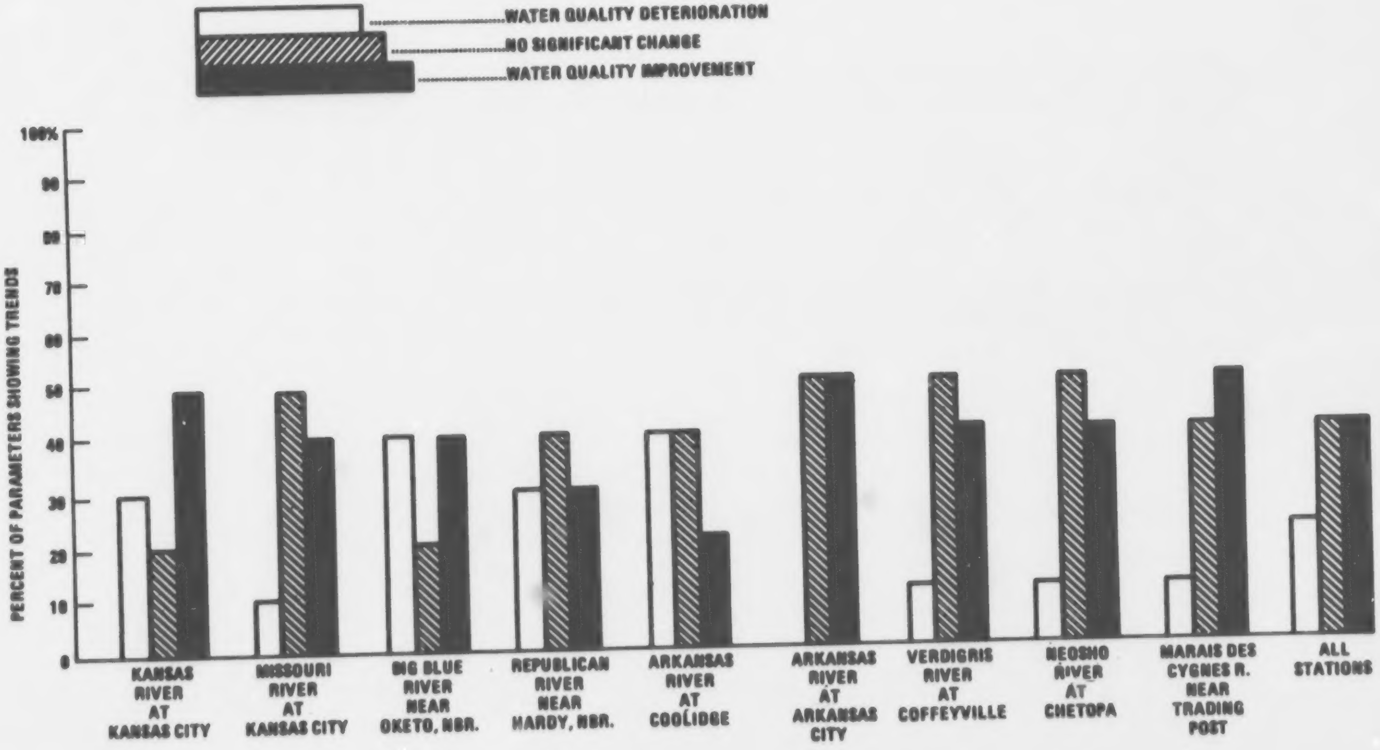
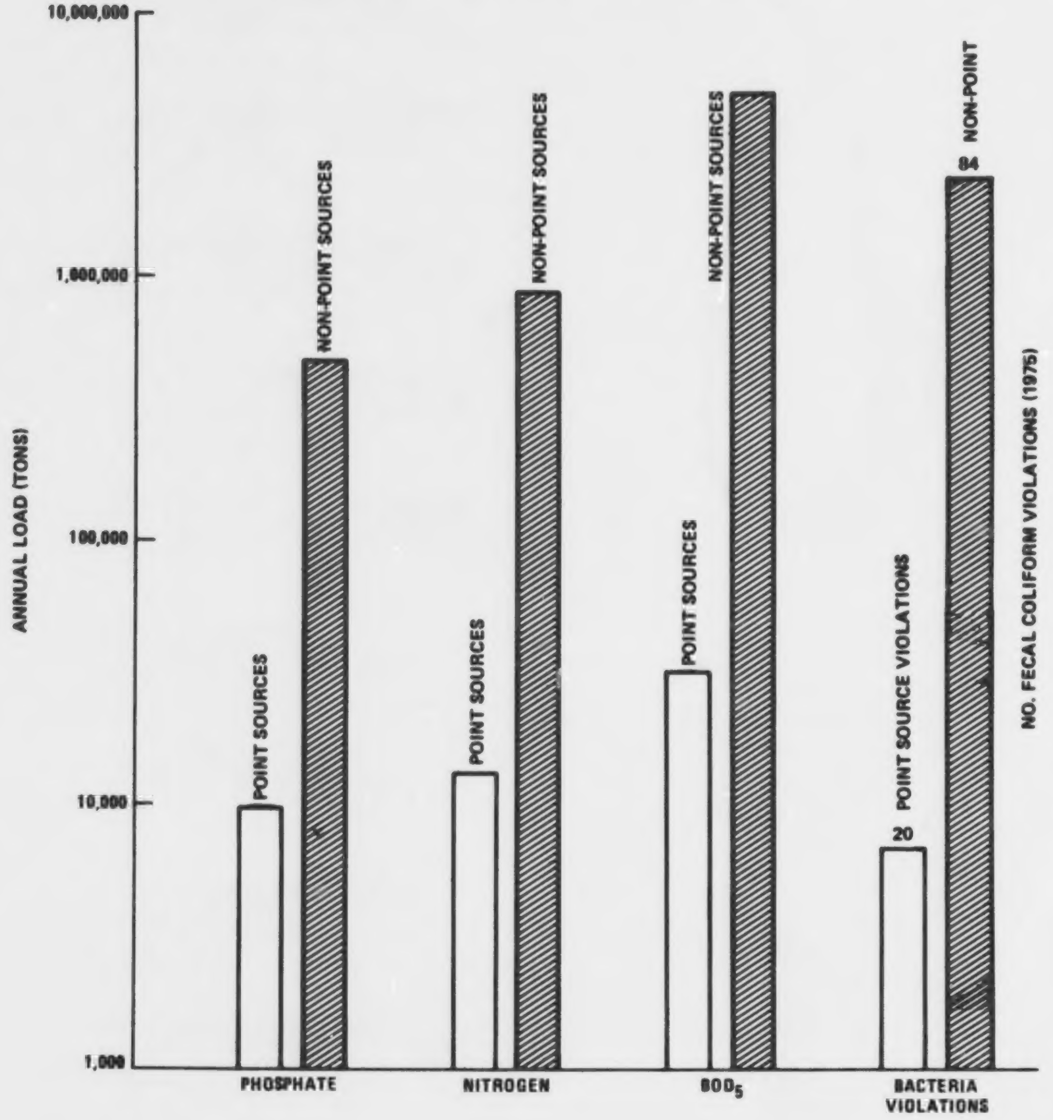


FIGURE 3
COMPARISON OF POINT SOURCE AND NON- POINT SOURCE CONTRIBUTIONS



Water Quality Standards Violations

Water quality data from the State surveillance program indicated that 130 specific water quality standards violations occurred in Class B waters during calendar year 1975. No violations were identified in Class A waters. Of the above violations, 30 were associated with municipal wastewater discharges, 16 were associated with industrial wastewater discharges, and the remaining 84 were associated with rural and urban non-point runoff. Standards violations associated with municipal discharge occurred in six segments: Arkansas River AR-1, Arkansas River UA-1, Kansas River KS-1, Cottonwood River NE-2, Indian Creek MO-5, and Marmaton River MC-3. Violations associated with industrial discharge occurred in four segments: Cottonwood River NE-2, Arkansas River UA-1, Walnut River WA-1, and Cow Creek AR-6. The standards violations are listed below:

Cause	Fecal coliform	Ammonia	DO	pH	Chloride
Municipal point source	20	4	6	–	–
Industrial point source	–	2	3	–	11
Non-point runoff	84	–	–	–	–

All dischargers associated with the above violations are now on implementation schedules for compliance with 1977 treatment requirements, or have facility upgrade projects in progress. Extreme variance in hydrologic conditions across the State accounted for fewer standards violations than were recorded in 1974.

Water Uses – 1983 Water Quality Goals

All Class A waters in the State are currently suitable for all intended uses as defined in the water quality standards, with the exception of a mineralization problem in Wilson Reservoir which is limiting municipal and industrial water supply and agricultural uses of that lake. All Class A waters in the State are currently meeting the 1983 water quality goals of body contact recreation and bio-support.

Of the Class B waters, 33 segments are currently suitable for all intended uses as defined in the water quality standards. In 26 segments water supply and/or agricultural uses are limited by natural mineralization. Suitable quality for secondary contact recreation is marginal in seven segments where the above listed standards violations associated with point sources are occurring. Full bio-support is being limited locally in two segments as a result of oxygen stress from organic loading. Since unimpounded surface waters in the State are generally unusitable for body contact recreation from the standpoint of channel geometry, flow patterns, and natural pollution sources, the attainable 1983 water quality goals for streams in Kansas are currently interpreted as secondary contact recreation and bio-support. From this standpoint, 55 of the 62 segments are currently meeting the 1983 goals. Figure 4 shows those segments where water use is limited by point sources and natural mineralization.

Cost/Benefit Implications

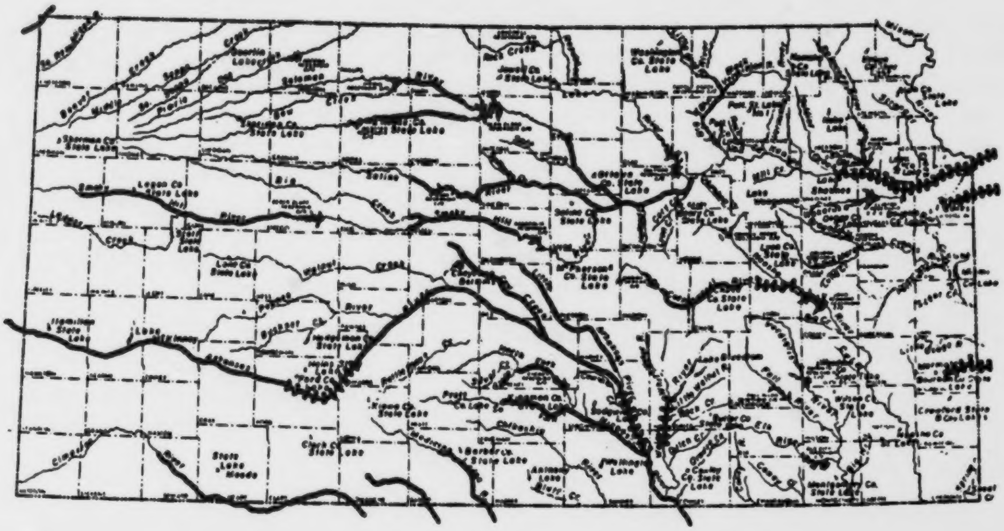
The major costs identified in this report for point source and non-point source control required by PL 92-500 are summarized below:

	Initial cost	Annual costs
Point source control		
Municipal	$2,086,000,000	$104,150,000
Industrial	155,540,000	9,300,000
Agricultural	2,596,000	130,000
Total	$2,244,136,000	$113,580,000
Non-point source control		
Rural runoff	$1,538,900,000	$232,100,000
Urban runoff	2,408,700,000	120,435,000
Construction		26,281,000
Mine drainage	21,650,000	3,000,000
Total	$3,969,250,000	$381,816,000

If applied to the total length of flowing streams and rivers in Kansas, the $6,213,000,000 expenditure for point source and non-point source control would result in a statewide average cost of over $600,000 per mile of stream. Further cost/benefit investigations now underway in the 1976 Needs Survey and in the Phase II River Basin Water Quality Management Plans will provide more insight into the economic benefits of water use. It is not currently anticipated that major increases in beneficial water use will be realized in most segments. Resulting increases in beneficial water uses can only be identified at the present time for eight of the 62 water quality planning segments.

FIGURE 4

STREAM WATER USE LIMITATIONS



NOTE: ALL STREAMS IN KANSAS
ARE SUBJECT TO USE LIMITATION
DURING PERIODS OF RAPID RUNOFF.

— ... WATER USE LIMITED BY NATURAL MINERALIZATION

‡‡‡‡‡ ... WATER USE LIMITED BY POINT SOURCES

APPENDIX A
Summary - State of Kentucky

Complete copies of the State of Kentucky 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality
Department for Natural Resources
and Environmental Protection
275 East Maine Street
Frankfort, KY 40601

Introduction

This report is written to fulfill the requirement under PL 92-500, Section 305(b), to provide a report containing a description of the current water quality and the effects of water quality programs in Kentucky. The description is to include an indication of the extent to which water quality has, can, and will meet the goals of this act under these programs. To this end, the Kentucky Division of Water Quality has assembled information on past and current water quality. Future water quality in Kentucky can only be predicted in general terms in anticipation of policies and decisions of local, State and Federal agencies.

The information which has been compiled and is presented is an update of the 1975 "Kentucky Water Quality Report to Congress." This report consists of a re-compilation of water quality data for periods prior to January 1, 1975, and data collected during calendar year 1975. The water quality data used were collected and reported to the U.S. Environmental Protection Agency's (EPA) STOrage and RETrieval (STORET) computer system by the U.S. Geological Survey. The data was retrieved from the STORET system and summarized in charts and tables. The Kentucky Division of Water Quality data on trace elements and bacteriological analyses were also used. Information concerning point source discharges was updated from the continuing planning efforts under Section 303(e), PL 92-500. The status of municipal construction grants was updated. A new section on major lakes was added. The U.S. Army Corps of Engineers provided a summary of the projects within the three Districts in Kentucky. The Ohio River Valley Sanitation Commission prepared an assessment of the "Ohio River Main Stem" which is available for calendar year 1975.

Summary of Water Quality in Kentucky

The quality of water in Kentucky is the result of the interactions of rain waters contacting the earth, flowing over the land, soaking into and passing through the soil, over minerals, dissolving minerals into the waters, and the waters transporting materials to the streams. The materials with which water contacts on its way to a stream or lake will dictate what these waters contain once they reach a stream or lake. Inorganic materials (soil constituents, calcium, sulfate, chloride, etc.) will make up the bulk of the dissolved solids and will determine a water's hardness, its acidity/alkalinity, and other characteristics. Organic materials carried in the waters will effect to some degree the level of dissolved oxygen in the water through physical and biological processes in these waters.

As you read the different sections of this report, each written for a particular river basin, the characteristics of a river basin which have an effect on water quality will become evident. The size of a basin will determine how sensitive or insensitive to inflow quality a river basin is. A small basin like the Salt River will react quickly to rains, while a large impounded basin like Tennessee is relatively stable and slow to change.

The geology in a basin will affect the type of water produced. For example within the Kentucky River Basin (Figure H-2, North Folk Kentucky River, Page 212), shows waters which have contacted disturbed earth in the Eastern Kentucky coal fields. This water is hard, high in dissolved solids, high in sulfate, high in acidity at times and high in chlorides. In contrast, the Red River, Pine Ridge in the same river basin (Figure H-4, Page 214) shows waters which have had few dissolved solids added, are relatively soft, have normal alkalinity and are of generally high quality.

The hydrology of each river basin has been presented. The term hydrology is used here to mean a summary of the important aspects of the amount of water which has been discharged past a measuring location on a stream. Table 1 shows the relative amount which eight of the ten river basins discharge during an average year.

TABLE I

AVERAGE DISCHARGE FROM RIVER BASINS IN KENTUCKY

Ohio River	262,000 cfs
Tennessee River	64,000 cfs
Cumberland River	27,500 cfs
Upper Cumberland River	9,100 cfs
Green River	11,000 cfs
Salt River	3,300 cfs*
Kentucky River	7,200 cfs
Licking River	4,150 cfs
Big Sandy	4,450 cfs

NOTE: These are the most downstream stations in each basin.

*Sum of the two main streams, Rolling Fork and Salt River.

The population within a river basin will have an effect on streams due to the location and concentration of organic loads imposed on these streams. Table 2 shows the population within each basin.

TABLE 2

RIVER BASIN POPULATION IN KENTUCKY

Basin	Population (1970 censes)	Drainage area Kentucky	Population density No./Sq.Mi.
Mississippi	56,637	1,250	45.3
Ohio	993,001	6,090	163.1[1]
Tennessee	68,412	1,000	68.4
Lower Cumberland	92,380	1,900	48.6
Upper Cumberland	260,000	5,077	51.0
Green	426,000	8,821	48.3
Salt	507,233	2,932	173 [2]
Kentucky	534,000	7,033	105 [2]
Licking	211,000	3,700	57.0
Big Sandy	112,000	2,285	49.5
Total	3,261,072	40,088	81.3

Population greater than 50,000:

[1] Louisville, Owensboro

[2] Lexington.

Table 3 shows the point source loads on streams which are predicted to depress the dissolved oxygen below 5.0 mg/l as a result of the population distribution within each basin. This table shows the effect of all treated effluents on streams in Kentucky in relation to the predicted dissolved oxygen content during design flows. Table 3 also shows that municipalities in Kentucky contribute 35 percent, industries contribute 7 percent, and small discharges contribute 58 percent of the organic point source loads which may cause dissolved oxygen to be less than 5.0 mg/l in Kentucky streams.

TABLE 3

POINT SOURCE LOADS* IN KENTUCKY STREAMS

Basin	Stream miles studied	Total miles	Dissolved oxygen predicted less than 5.0 mg/l		
			Municipal	Industrial	Other
Mississippi	275	84	13	26	45
Ohio	431	85	36	8	41
Tennessee	248	59	15	14	30
Lower Cumberland	360	62	40	0	22
Upper Cumberland	752	167	25	0	151
Green	1,670	214	173	6.8	34.5
Salt	596	160	61	8	91
Kentucky	868	145	119	0	26
Licking	1,000	384	89	46	249
Big Sandy	560	250	10	5	235
Total	6,760	1,609	570	114	925

*1975 Wasteload Allocation from 303(e) River Basin plans.

There are 181 construction grants either underway or pending in Kentucky for municipal wastewater control. Of these 181, 161 are Step I's (evaluations), 9 are Step II's (design) and 11 are Step III's (construction). During the last year, eight plants were given final approval on completed construction. This completed construction improved approximately 20 miles of Kentucky streams. Table 4 is a summary of the grant status in Kentucky. Each river basin section contains a list of the facilities receiving grants.

TABLE 4

SUMMARY OF GRANTS TO MUNICIPALITIES IN KENTUCKY

Basin	Step I	Step II	Step III
Mississippi	7	0	0
Ohio	33	2	3
Tennessee	5	0	0
Lower Cumberland	7	0	1
Upper Cumberland	21	1	0
Green	27	0	1
Salt	9	3	2
Kentucky	30	1	2
Licking	14	2	2
Big Sandy	8	0	0
Total	161	9	11

NOTE: These are pending and projects underway.

Table 5 shows the municipal dollar needs estimated in 1974 by category in order that cities in Kentucky may meet water quality criteria and growth expectations.

The trace chemical water quality was compared to standards set by Kentucky in relation to health and public water supplies and to proposed EPA standards. The waters which did not meet these standards are in coal mining areas. The streams were Tradewater River, Olney (iron greater than 300 mg/l), and Pond River near Sacramento (fluoride greater than 1.0 microgram/liter).

The Division of Water instituted bacteriological monitoring at selected public water supply treatment facilities in FY 74. The data from this program are presented in the water quality data tables. Since the period of record is only two years, no concrete conclusions have been drawn from the data at this time. A preliminary cursory look at this data indicates that the coliform bacteria (total and fecal) are high in relation to the State criteria. A simple arithmetic mean of all total coliform data gives a result of 2,600 colonies per 100 ml statewide. This represents 644 observations of which 263 were greater than the standard or 41 percent exceedance.

When this recreational standard was exceeded or expected to be exceeded, a determination of fecal coliform was made. Of 238 observations of fecal coliform, 90 or 38 percent, were greater than 400 colonies per 100 ml. The sixth annual report of the Council on Environmental Quality on Page 361, Table 18 shows that 67 percent of the analyses for fecal coliform exceeded the recreation criterion. The arithmetic average of fecal coliform analyses in Kentucky was 85 colonies per 100 ml of stream water analyzed.

A copy of Kentucky's current regulation 401 KAR 5:025 is included in the report for your reference in comparing specific quality conditions reported to the current standards. These standards also appear in each data section of the river basin reports for each parameter reported.

TABLE 5

1974 NEEDS SURVEY

Category	1974 Needs (thousands of dollars)
Category I Secondary treatment	54,751
Category II Advanced treatment	294,166
Category III A Inflow/infiltration correction	62,743
Category III B Major sewer system rehabilitation	84,181
Category IV A New collectors	543,749
Category IV B New interceptors	412,632
Category V Correction of combined sewer overflows	706,559
Category VI Treatment and/or control of stormwaters	2,052,631
Total	4,211,412

APPENDIX A
Summary - State of Maine

Complete copies of the State of Maine 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality Evaluation and Planning
Bureau of Water Quality Control
Department of Environmental Protection
Statehouse
Augusta, ME 04330

Introduction

The State of Maine, situated in the northeastern corner of the United States, covers an area of 33,215 square miles. Some 2,175 square miles (7 percent) are covered with over 5,500 lakes and ponds. Eleven major river basins are located at least partially within the State's boundaries (Figure 1). The largest of these, located entirely within the State, is the Penobscot River Basin with a drainage of 8,910 square miles.

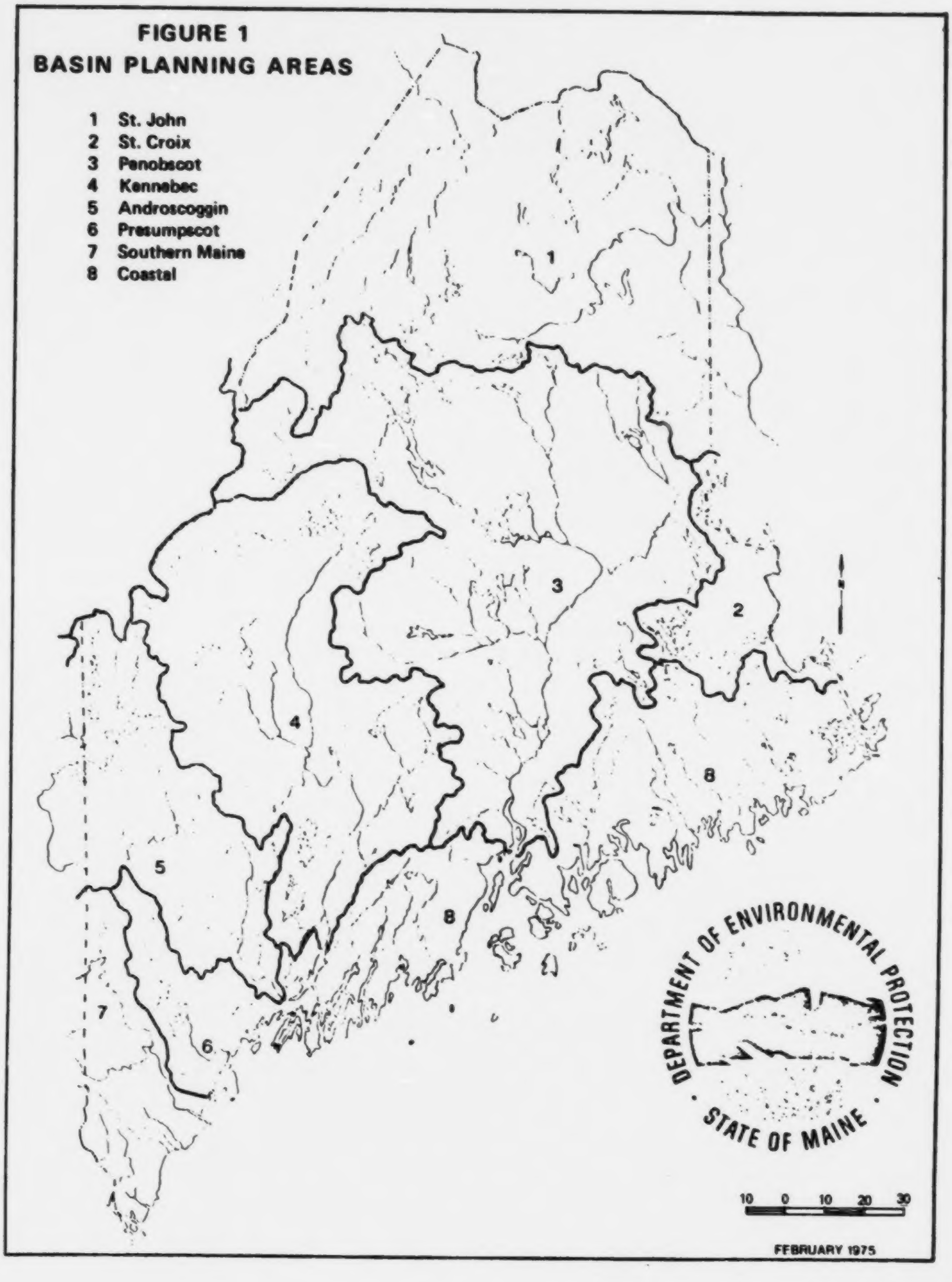


FIGURE 1
BASIN PLANNING AREAS

1 St. John
2 St. Croix
3 Penobscot
4 Kennebec
5 Androscoggin
6 Presumpscot
7 Southern Maine
8 Coastal
1
2
3
4
5
6
7
8
8
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF MAINE
10 0 10 20 30

FEBRUARY 1975

Maine's 3,500 mile coastline abuts the Atlantic Ocean forming numerous bays and harbors.

The lakes, rivers, and the coastline provide for numerous activities. Recreational interests include fishing, boating, swimming, and sightseeing. Many lakes and ponds serve as the water supply for various communities. Commercial interests include fish and shellfish harvesting. Rivers in the State provide for power generation, and in some cases for transportation.

The progress of the on-going effort to clean up certain waterways of the State and maintain the predominantly high quality of the others is stated in this report. This year's 305(b) Report updates last year's comparatively extensive report and states the projects completed during the past year and those presently being undertaken.

Summary

Water quality within the State has improved some during the past year through the construction of treatment facilities in various municipalities and industries, and has been measured through the efforts of certain government agencies. Recent trends show improvement because of these new facilities, although additional Federal funds are needed if these trends are to continue.

Table 1 gives the present water quality status within the State's major river basins. As yet it is too early to measure the extent of the lasting benefits that have been derived by the introduction of waste treatment facilities put into operation last year.

Maine's second largest industry is tourism. Visitors flock into the State during all four seasons but the influx is greatest, of course, during the summer season. This is due chiefly to Maine's climate, camping, and summer resort areas. The continuance of this thriving industry can only be guaranteed by maintaining our predominantly high-quality waters and by improving the quality of those that are not high quality. The pollution problem is greatest at the same time the State has its largest number of tourists—during the summer months. This stresses the need for adequate planning to ensure that water quality will not be degraded during high waste generation periods that are coupled with low flow times.

Maine's largest industry is the fishing industry. Water quality along the coast obviously has a direct bearing on how prosperous the fishing industry will be. Many shellfishing areas have been closed due to malfunctioning septic systems, "straight pipes," and some agricultural runoff. Table 2 lists the shellfishing areas that have been reopened due to waste treatment facilities.

The cost of constructing waste treatment facilities is high but must be met to ensure economic stability of Maine's two largest industries. Reduction in pollution abatement efforts would have a direct disastrous effect on both the fishing and tourist industries.

In the past, non-point source pollution has been largely ignored as a source of water quality degradation. Its existence had been accepted but little investigation had been done due to the difficulty of identifying it and the problems associated with its correction. Recently however, an increased effort has been taken towards the non-point source problem. The chief contributors to the problem come from agricultural and silvicultural activities along with malfunctioning private septic systems which contaminate ground water.

TABLE 1

STATE OF MAINE 305(b) WATER QUALITY INVENTORY SUMMARY

1 River basin or coastal drainage including mainstem and major tributaries	2 Total miles	3 Miles *now* meeting Class B (fishable/swimmable)	4 Miles expected to meet Class B by *1983*	5 Miles *now* meeting State WQ Standards	6 Miles *not* meeting State WQ Standards	7* Water quality problems	8 Point source causes of WQ problems M=Municipal I=Industrial	9 Non-point source causes of problems 1=Major 2=Minor 3=N/A
Penobscot	379	180	364.4	364.4	14.6	4,5,6,	M.I	3
Kennebec	325	152	263.2	263.2	61.8	4,5	M	1
Androscoggin	320	150	313.7	313.7	6.3	1,2,5,6	M.I	2
St. John	351	269	278.6	259.7	91.3	2,5,6	M.I	1
Salmon Falls Piscataqua	157	120	157	157	–	5,6	M	2
Saco	230	212	227.5	227.5	2.5	1,5,6	M.I	2
St. Croix	87	77	77	77	20	5,6	I	3
Presumpscot	58	21	58	51.3	6.7	5,6	M.I	2

*Column 7-*Water Quality Problems:* 1. Harmful substances; 2. Physical modification (suspended solids, temperatures etc.); 3. Eutrophication potential; 4. Salinity, acidity, alkalinity; 5. Oxygen depletion; 6. Health hazards.

TABLE 2

ACRES OF CLAM FLAT AREAS CLEANED UP DUE TO WASTE TREATMENT FACILITIES

Facility	Receiving water	Class of receiving water	DEP basin planning area	Acres of clam flats cleaned up due to facility*
Cape Elizabeth	Spurwink River	SC	Presumpscot	(Seasonal depuration) 17
Mt. Desert Northeast Harbor	Tidewaters of Mt. Desert	SB-1	Coastal	240
Ogunquit S.D.	Ogunquit River Estuary	SB-2	Southern Me.	40
Thomaston	St. George River Estuary	SA	Coastal	Approx. 1,280
Waldoboro	Medomak River Estuary	SA	Coastal	Approx. 980
Wiscasset	Sheepscot River Estuary	SB-1	Coastal	Seasonal 30
Yarmouth	Royal River Estuary	SB-2	Presumpscot	Depuration 31

NOTE: Taken in part from Regional Administrator's Report, Region I - New England, *Environmental Quality in New England*, July 1975.

*Of these areas cleaned up, approximately 2,500 acres have been opened to harvesting.

More effort in these areas is needed to establish good conservation practices in agriculture and forestry. More public participation and awareness is needed in areas involving individual disposal site selection. Additional work is needed to determine the extent of the various causes of non-point source pollution and to discover and implement various control measures to reduce this problem.

The following specific problem areas exist in some river basins around the State where water quality standards are violated.

1. The Little Androscoggin River from South Paris to Oxford.
2. The Sebasticook River from the Irving Tanning outfall to the confluence with the Kennebec River.
3. The East Branch of the Sabasticook River from Dexter Village to the confluence with the main branch of the Sebasticook River.
4. The Penobscot River from the confluence of Millinocket Stream to Weldon Dam.
5. The Presumpscot River from Westbrook to Falmouth.
6. The St. Croix River from the Georgia Pacific Co. outfall in Woodland to the head of tide at Calais.
7. The St. John River from the Fraser Paper Co., Ltd. outfall in Madawaska to the U.S. Canadian border.
8. The Aroostook River from the confluence of Salmon Brook at Washburn to the U.S. Canadian border.
9. The Prestile Stream from the Vahlsing, Inc. outfall to the U.S. Canadian border.
10. The Mousam River from the outfall of the Sanford Sewerage District lagoons to the head of tide.
11. The Goosefare Brook from the outfall of the Maremont Corporation in Saco to the head of tide.

With the exception of the segments on the Presumpscot River and Prestile Stream, it appears that these areas will not meet the 1983 goals. Table 1 lists the distances involved in these segments.

APPENDIX A
Summary - State of Maryland

Complete copies of the State of Maryland 305(b) Report can be obtained from the State agency listed below:

Maryland Environmental Service
Tawes State Office Building
Annapolis, MD 21404

Introduction

The State of Maryland prepared a very detailed Section 305(b) Report entitled, "Maryland Water Quality – 1975," which was released in November 1975. In the interest of continuing a sustained effort in various other aspects of the State's water quality management program, the State concluded for 1976 only to update the respective sub-basin chapters of the Section 305(b) Report. For that reason, listed below in the remaining sections of this report, are the updated materials provided by the Water Quality Services Section of the Water Resources Administration. This material has been written based on the sampling work accomplished in 1975 and the subsequent analysis of it.

The Water Quality Services Section's priorities at the present time are to continue intensive monitoring to provide information for wasteload allocations, continue the non-point source sampling initiated in the Ocean Coastal area, and use experience gained there in accomplishing work under contract to the Regional Planning Council, a designated agency for areawide waste treatment management planning in the Baltimore region. The Sections will also undertake the necessary effort of non-point source assessment in the non-designated areas of the State. The Planning section, which has edited this report in final form, has concentrated its efforts on completing the Phase 1 Water Quality Management Plans and developing the Phase 2 Work Plan for Water Quality Management Planning. The State has determined these respective activities of the Water Quality Services and the Planning Sections to be of higher priority than the additional effort at this time on the Section 305(b) Report.

Summary

As indicated in the sub-basin sections, in many segments there have not been any significant changes discerned in water quality because there has not been any additional sampling to speak of in 1975. Furthermore, many segments that were sampled did not indicate any significant change.

Noteworthy among the improvements are the Patapsco and Patuxent Basins. It is worth noting that over the last year, 47,000 acres have been opened for shellfish harvesting and 23,000 acres closed for a net gain of 23,700 acres of shellfish harvesting opened in the last year.

Noteworthy among the setbacks in terms of water quality are the continuing difficulties of establishing non-point source control to the extent of eliminating shellfish closures in the Patuxent Basin and the particular water quality problems created by hurricane "Eloise."

Included in each of the nondesignated area sub-basin chapters is the text from the submitted grant application for Phase 2 planning that deals with the subject of non-point source assessment. Additional material on this subject will be forthcoming as the State initiates and completes its Phase 2 water quality management planning effort.

An estimate has been made of the cost of preparing or revising conservation plans for all of the farms in the State, a continuation of the current soil conservation service program which is carried out through the conservation districts in each county of the State. This information (Tables 1 and 2) is the only detailed information available at this time on non-point source control.

The State has received a grant offer in the amount of $148,457 with which to undertake Phase 2 planning in 16 counties. Additional funds are expected in the near future.

Within the last year, Phase 1 Water Quality Management Plans have been completed and adopted for the Elk, Youghiogheny and Lower Susquehanna sub-basins. The Potomac Metropolitan Area Sub-Basin plan was adopted in March 1975. In addition, draft plans have been completed for the North Branch Potomac, Upper Potomac, Middle Potomac, West Chesapeake, Nanticoke, Pocomoke, Ocean Coastal and Patuxent sub-basins. The draft Patapsco Plan on which hearings were held in 1975 is still under revision. The reader is referred to these plans.

This year's report does not include an updated summary of the Overview of the Potomac Basin.

The basin plans also carry additional information on the cost for meeting the point source control needs.

TABLE 1

STATUS OF CONSERVATION PLANNING (1975) BY COUNTY

	Conservation agreements approved & on File *		Total acres covered by agreements		Conservation plans developed for		Total acres covered by plans		Estimated No. of agri. operating units in county		
	Acres		Acres		Acres		Acres		Acres		Acres in Co.
	0–9	10+	0–9	10+	0–9	10+	0–9	10+	0–9	10+	
Anne Arundel	102	435	381	64,150	73	290	258	31,392	50	420	266,841
Harford	35	969	212	198,861	32	729	194	173,654	44	795	286,720
Dorchester	56	1,050	237	218,346	27	617	130	128,111	25	450	371,198
Queen Anne's	41	666	232	144,949	19	360	119	76,105	120	1,093	238,719
Kent	17	692	84	142,804	12	400	58	71,020	40	550	181,760
Baltimore	64	948	358	122,565	50	811	228	91,424	132	934	389,260
Allegany	72	573	310	135,629	54	475	238	96,749	86	774	272,641
Caroline	9	969	44	129,571	6	761	33	101,781	120	1,100	204,801
Talbot	10	328	56	69,071	6	185	33	37,165	27	385	178,560
Cecil	49	544	248	95,184	25	330	130	51,193	24	560	225,281
Howard	37	616	175	82,146	20	370	98	56,534	108	885	159,750
Frederick	47	1,315	262	137,382	33	946	184	117,984	90	2,560	424,961
Washington	17	883	106	129,854	13	683	77	95,650	40	920	295,675
Charles	31	732	199	132,307	19	516	125	92,010	100	1,080	293,126
St. Mary's	21	649	167	106,024	15	534	133	87,112	244	956	234,878
Garrett	6	462	31	79,424	4	251	27	47,631	25	732	423,678
Calvert	84	560	352	58,633	46	421	186	41,645	212	934	140,159
Somerset	39	740	250	104,996	39	677	227	97,145	150	2,000	212,480
Montgomery	22	425	109	72,479	13	208	55	35,837	25	720	315,606
Wicomico	30	779	166	82,429	23	607	128	62,814	212	825	243,201
Worcester	28	948	168	156,768	22	712	130	133,978	127	987	309,121
Prince George's	26	261	93	59,098	19	223	72	33,213	250	1,000	310,258
Carroll	19	1,072	105	119,958	17	906	93	100,338	50	2,950	239,871
Total	862	16,616	4,345	2,642,619	587	12,012	2,956	1,860,485	2,301	23,610	6,268,545

Source: Soil Conservation Service, College Park.

*Conservation agreements number includes holdings that are not classed as commercial agriculture. Estimated number of agricultural operation units in county column does not include non-agriculture operating units which may well be agreements.

TABLE 2

PROJECTED TEN YEAR COSTS OF PLANNING APPLICATION OF FARM CONSERVATION PLANS IN THE STATE OF MARYLAND

Alternative	Plan production (No.)	Total estimated cost[1] ($1,000,000)
Current program	13,775	$15,900,000
Accelerated beyond current program	10,819	19,400,000
Total accelerated program accomplishment	24,594[1]	35,300,000
Indirect costs		$10,600,000
Total		$45,900,000

[1] Total includes revisions to keep completed plans current; 23,610 operating agricultural units in Maryland in 1975.

APPENDIX A

Summary - State of Massachusetts

Complete copies of the State of Massachusetts 305(b) Report can be obtained from the State agency listed below:

Commonwealth of Massachusetts
Water Resources Commission
Leverett Saltonstall Building
Government Center
100 Cambridge Street
Boston, MA 02202

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Summary

Introduction

The following report was prepared in response to Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL92–500). This report is an assessment of the present conditions of Massachusetts river basins as of January 1, 1976. The objectives of this report are:

1. To present the existing water quality of the main streams of the State based on the latest available data;
2. To compare the existing water quality with the stream classifications; and
3. To evaluate water quality problems preventing the streams from meeting their assigned goals.

Point Source Water Quality Problems

The Commonwealth of Massachusetts is divided into twenty-seven major drainage basins for the purpose of water quality management planning. These basins are the Massachusetts portions of the following rivers:

Hoosic River
Housatonic River
Deerfield River
Westfield River
Farmington River
Connecticut River
Millers River
Chicopee River
French and Quinebaug Rivers
Nashua River
Blackstone River
Merrimack River
Buzzards Bay drainage area
Ten Mile River
Concord and Sudbury Rivers
Assabet River
Shawsheen River
Parker River
Ipswich River
North Coastal drainage area
Boston Harbor
Charles River
North River
South Coastal drainage area
Cape Cod drainage area
The Islands
Taunton River

Together these basins drain some 9,645 square miles and comprise 1,462 major river miles. There has been a great deal of improvement throughout the State over past years. However, the most critical problems have yet to be solved. These problems dominate the water quality of the State's rivers and, in many cases, overshadow the benefits from the recent improvements. This is best indicated by the fact that only 440 (30 percent) of Massachusetts' major river miles are now meeting State Water Quality Standards (Table 1).

As a result of the existing water quality problems, the present quality of many of the State's streams are below desired levels; in fact, many segments are presently in unsatisfactory conditions. The causes of such extreme degradation are known and the necessary abatement measures have been given high priority so that 1983 fishable/swimmable goals can be met.

Non-point Source Problems

Sections affected by non-point sources are not listed in this submittal. This information is currently not available. Existing major untreated discharges in many river basins mask any effects which might be present from non-point sources. Water quality surveys will be completed in the river basins after secondary treatment facilities have been completed. These surveys, which will be carried out over the next three years, will locate sources of non-point pollution.

Conclusion

All known significant point sources of pollution have been issued National Pollutant Discharge Elimination System (NPDES) permits. These permits indicate the abatement measures necessary to meet the required water quality goals of the State.

Major intensive water quality surveys will be conducted by the Division in 1977, 1978, and 1979. At that time, construction of wastewater treatment plants will be either completed or near completion and the Division of Water Pollution Control will be able to assess its impact on the water quality. With the completion of these surveys, an assessment will be made as to how the treatment plant construction has helped toward upgrading water quality and meeting the 1972 requirements. The annual 305(b) updates will provide information concerning the progress of water quality towards both the 1972 requirements and the 1983 goals.

Continued emphasis is on construction of municipal and industrial water pollution control facilities, as well as evaluation of non-point sources of pollution.

TABLE 1

WATER QUALITY CONDITIONS IN MASSACHUSETTS RIVER BASINS

Drainage basin		River basin or coastal drainage (main stem and major tributaries)	Total miles	Miles now meeting Class B	Miles now meeting state WQ standards	Miles not meeting state WQ standards
Blackstone		328	106.8	30.7	35.7	71.1
Boston Harbor			43.75	0.0	6.9	36.85
Charles River		265	80.8	0.4	1.4	79.4
Chicopee		720	111.5	43.7	66.5	45.0
Connecticut		2,949	67.5	0.0	0.0	67.5
Deerfield		666	69.9	33.5	40.6	29.3
Farmington	(total)	602	18.4	18.4	18.4	0.0
	(Mass.)	149				
French and Quinebaug		241	56.6	19.1	20.3	36.3
Hoosic	(total)	713	42.6	17.3	19.6	23.0
	(Mass.)	165				
Housatonic	(total)	1,950	96.3	26.4	30.9	65.4
	(Mass.)	500				
Ipswich and Parker			66.4	64.1	64.1	2.3
Merrimack	(total)	5,000	115.39	0.0	0.0	115.39
	(Mass.)	1,200				
Millers	(total)	390	57.5	6.5	6.5	51.0
	(Mass.)	350				
Nashua		530	103.71	5.43	5.43	98.28
North River		105.4	20.6	11.6	11.6	9.0
Suasco		381	86.1	0.0	0.0	86.1
	(Sudbury	169)				
	(Assabet	175)				
	Concord	27)				
Taunton		530	134	18.0	35.2	98.8
Ten Mile		49	38.1	3.8	3.8	34.3
Westfield		517	114.2	68.7	73.4	40.3
Total		9,645.4	1,429.65	367.63	440.33	989.32
% of total miles				26%	31%	69%

APPENDIX A

Summary - State of Michigan

Complete copies of the State of Michigan 305(b) Report can be obtained from the State agency listed below:

Environmental Protection Bureau
Department of Natural Resources
Stevens T. Mason Building
Lansing, MI 48926

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Summary and Conclusions

What is the Present State of Michigan's Water Quality?

Michigan's abundant natural resources include over 36,000 miles of rivers and streams, more than 11,000 inland lakes, and 38,500 square miles of Great Lakes waters. Michigan has selected the Water Quality Index developed by the National Sanitation Foundation to present a summary of stream quality. As shown in Figure 1, most of Michigan's river basins rate good to excellent on the Water Quality Index scale for water year 1975. (October 1974 through September 1975). Generally, rivers in the basins shown as having medium water quality flow through more populous areas and receive waste loads from known point sources. Point source pollution control programs are underway in these basins which should improve water quality. Any problems which remain will have to be addressed by non-point source programs.

Recent studies on inland lakes show that approximately 40 percent of all Michigan lakes surveyed (with surface areas greater than 50 acres) are experiencing aging problems (eutrophication). Nutrients and pollutants enter lakes from direct discharges (industries, municipal wastewater treatment plants) and non-point sources (stormwater runoff, agricultural runoff). Presently there are 143 lakes and impoundments (greater than 50 acres) receiving industrial and/or municipal waste discharges directly or from tributaries where discharges are within 20 river miles upstream of the lake. Nutrient reduction in lakes from point sources is being achieved through removal of the point sources or improved treatment prior to discharge. Since 1965, approximately 24 industrial and/or municipal point sources have been removed from inland lakes. However, most of the nutrient addition to the lakes is believed to be the result of non-point sources.

Water quality in the Great Lakes is generally excellent with a few exceptions. Only a handful of municipalities, industries, and electrical generating plants discharge wastes directly to the Great Lakes. By contrast, the connecting channels of the Great Lakes are subjected to numerous waste loads from municipal and industrial sources. However, vigorous corrective programs have achieved overall improvements in water quality especially in the Detroit River.

Where Are We Going From Here?

According to PL 92-500, the natural water quality goals are to provide for the protection and propagation of fish, and for recreation in and on the water by July 1, 1983. Presently, most of Michigan's waters meet these goals. With very few exceptions, due mostly to natural limitations or to toxicity problems (Figure 2), it is expected that all waters in the State will meet these goals. Michigan has added an additional goal to provide water quality suitable for public water supplies.

National effluent goals are set up in three steps. By July 1, 1977 all publicly owned treatment plants must provide at least secondary treatment. All other point source dischargers must achieve the best practicable control technology (EPCT) as defined by EPA. By July 1, 1983 all publicly owned treatment works must provide BPCT. All other point sources must provide the best technology economically available. Finally, by 1985 all point source discharge of wastes must be eliminated. Michigan feels industries will generally meet the 1977 goal. However, problems with funding levels for the municipal plants will likely delay their meeting the 1977 goal. The 1983 and 1985 goals should be reviewed and possibly revised to reflect the actual progress toward the immediate 1977 goals. Consideration should be given to the improvement in water quality which would be realized through meeting these goals.

How is Michigan's Abatement Program Working?

Most regulatory efforts in Michigan have been directed to point source discharges. The effects of major point sources of pollution are best shown by comparing the water quality above and below major urban areas (Figure 3). Historically, the majority of Michigan's pollution problems have been caused by municipal sewage plant wastes. Fortunately, these sources can be controlled through existing technology. Effluent quality for these plants has improved in recent years (Figure 4). Industrial wastes are also contributors to the pollution problem. Improvements in municipal and industrial effluents are directly related to the time schedules for pollution control established in permits to discharge. The majority of Michigan industries are expected to meet final effluent limitations by the end of 1976. Surveillance programs follow the industries' compliance with permit conditions. Figure 5 indicates the shift in emphasis of enforcement activities from time schedule violations to the failure to meet the final effluent limits defined in the permits.

Accidental discharges and all spills, and other hazardous pollutants are problems which are not controlled through programs aimed at point source discharges. Therefore, Michigan initiated its Pollution Incident Prevention Plan (PIPP) program to prevent accidental losses from occurring. Accidental losses should continue to create fewer environmental problems due to the PIPP program.

The control of non-point sources of pollution is beginning to receive more attention in Michigan. A Soil Erosion and Sedimentation Control program is underway which requires counties or local agencies to issue permits for earth changes which might affect water quality. In addition, local planning groups are beginning to thoroughly study the problem of sediment delivery and storm runoff to Michigan's waters.

FIGURE 1

AVERAGE WATER QUALITY
WATER YEAR 1975

THE AVERAGE WATER QUALITY CONDITIONS, AS MEASURED BY THE WATER QUALITY INDEX, AT STATIONS SAMPLED BY THE MICHIGAN WATER RESOURCES COMMISSION

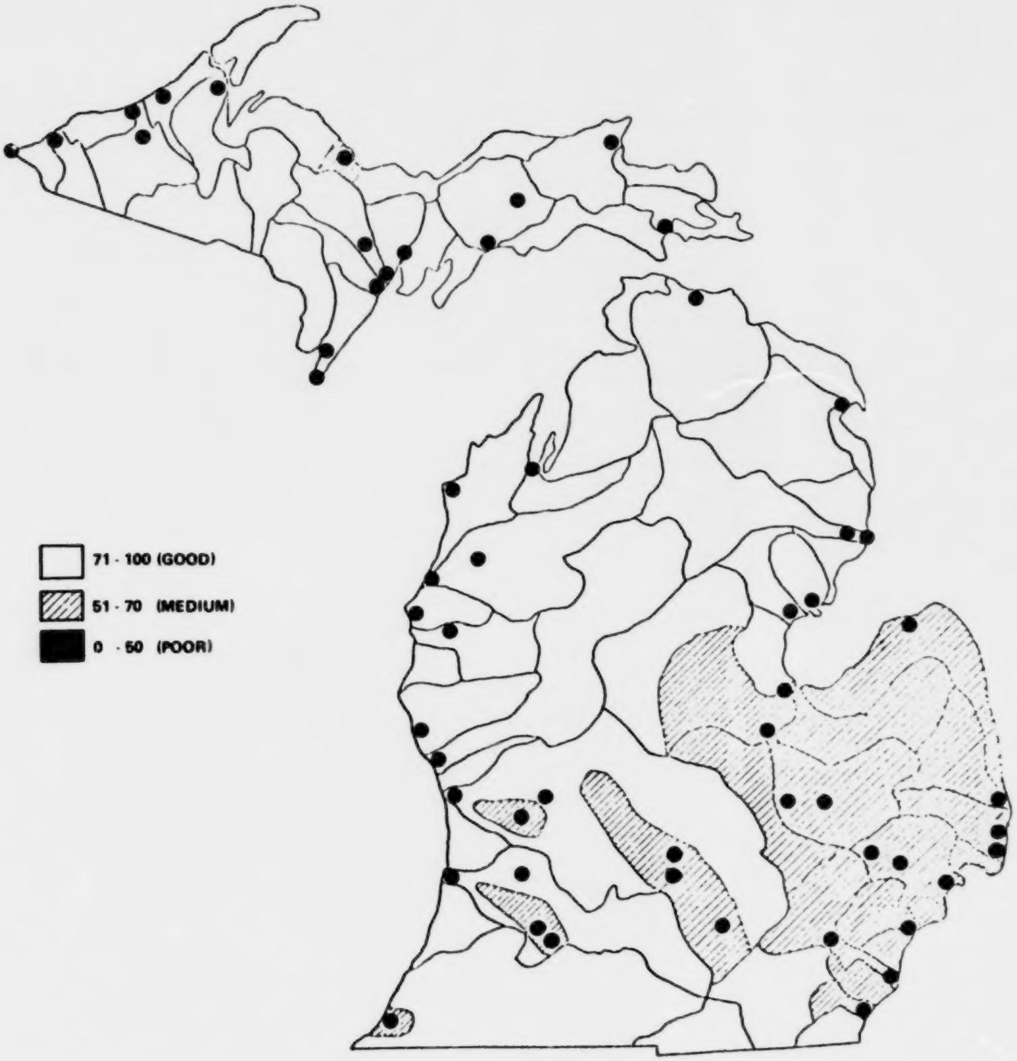

☐ 71 - 100 (GOOD)
▨ 51 - 70 (MEDIUM)
■ 0 - 50 (POOR)

FIGURE 2
FISHING BANS AND RESTRICTIONS

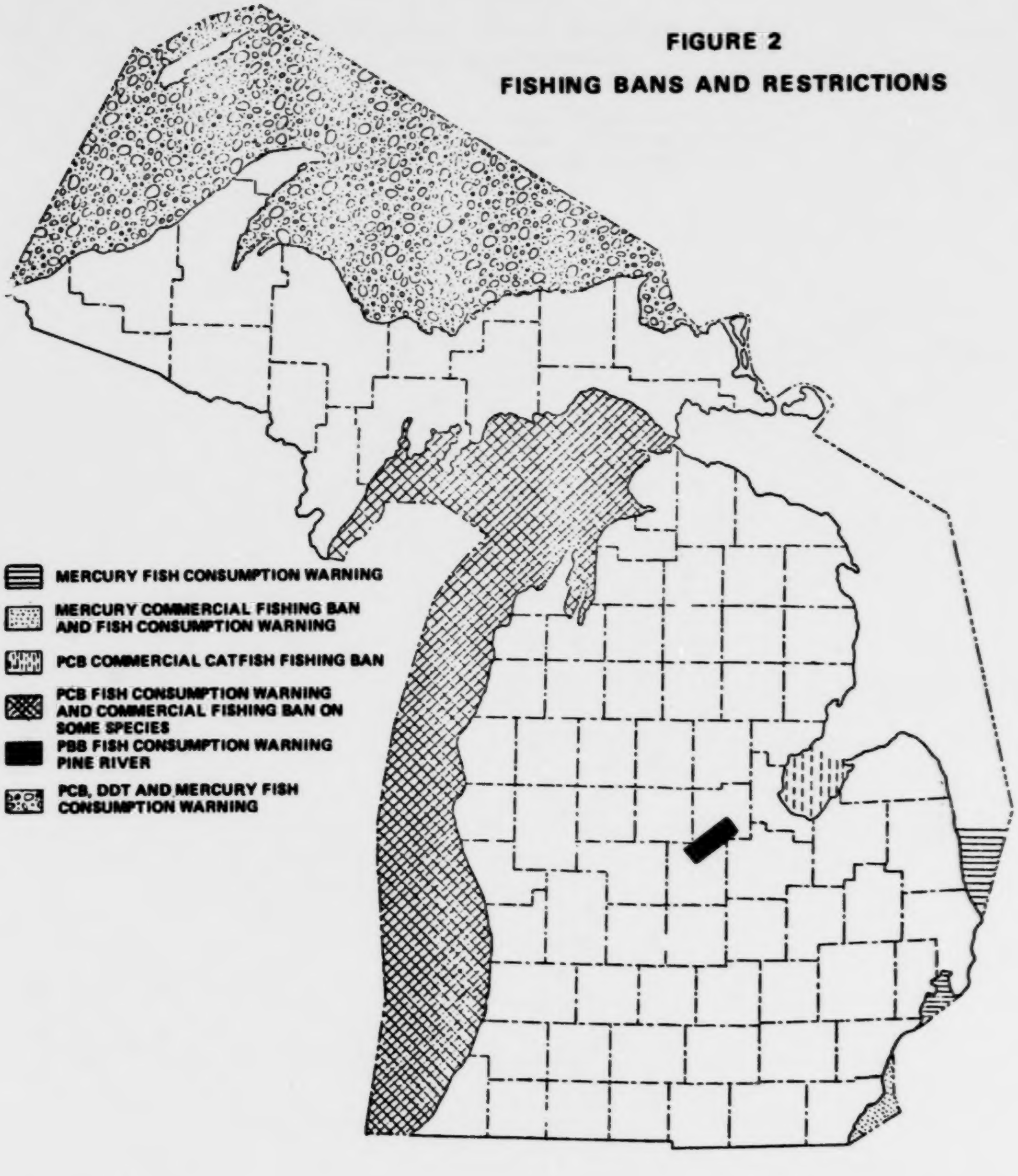

MERCURY FISH CONSUMPTION WARNING
MERCURY COMMERCIAL FISHING BAN AND FISH CONSUMPTION WARNING
PCB COMMERCIAL CATFISH FISHING BAN
PCB FISH CONSUMPTION WARNING AND COMMERCIAL FISHING BAN ON SOME SPECIES
PBB FISH CONSUMPTION WARNING PINE RIVER
PCB, DDT AND MERCURY FISH CONSUMPTION WARNING

FIGURE 3

IMPACT OF URBAN AREAS ON WATER QUALITY WATER YEAR 1975

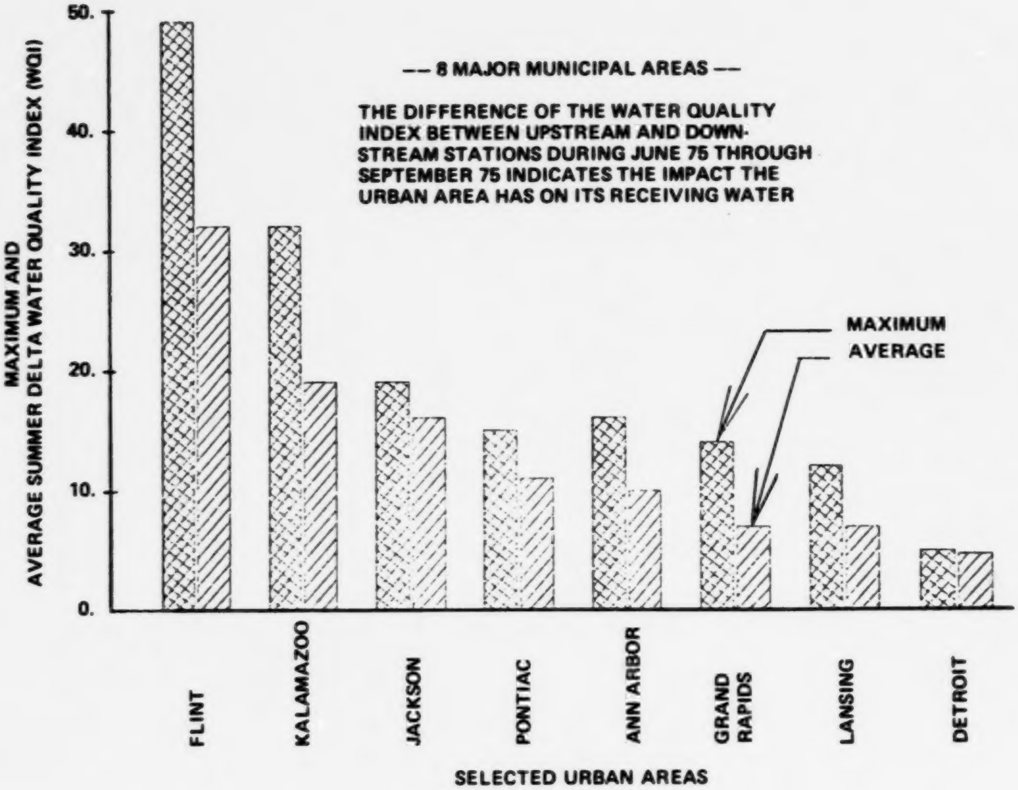


FIGURE 4
EFFLUENT QUALITY AND CONSTRUCTION GRANT DOLLARS ALLOCATED FOR MAJOR MUNICIPAL WASTEWATER TREATMENT PLANTS

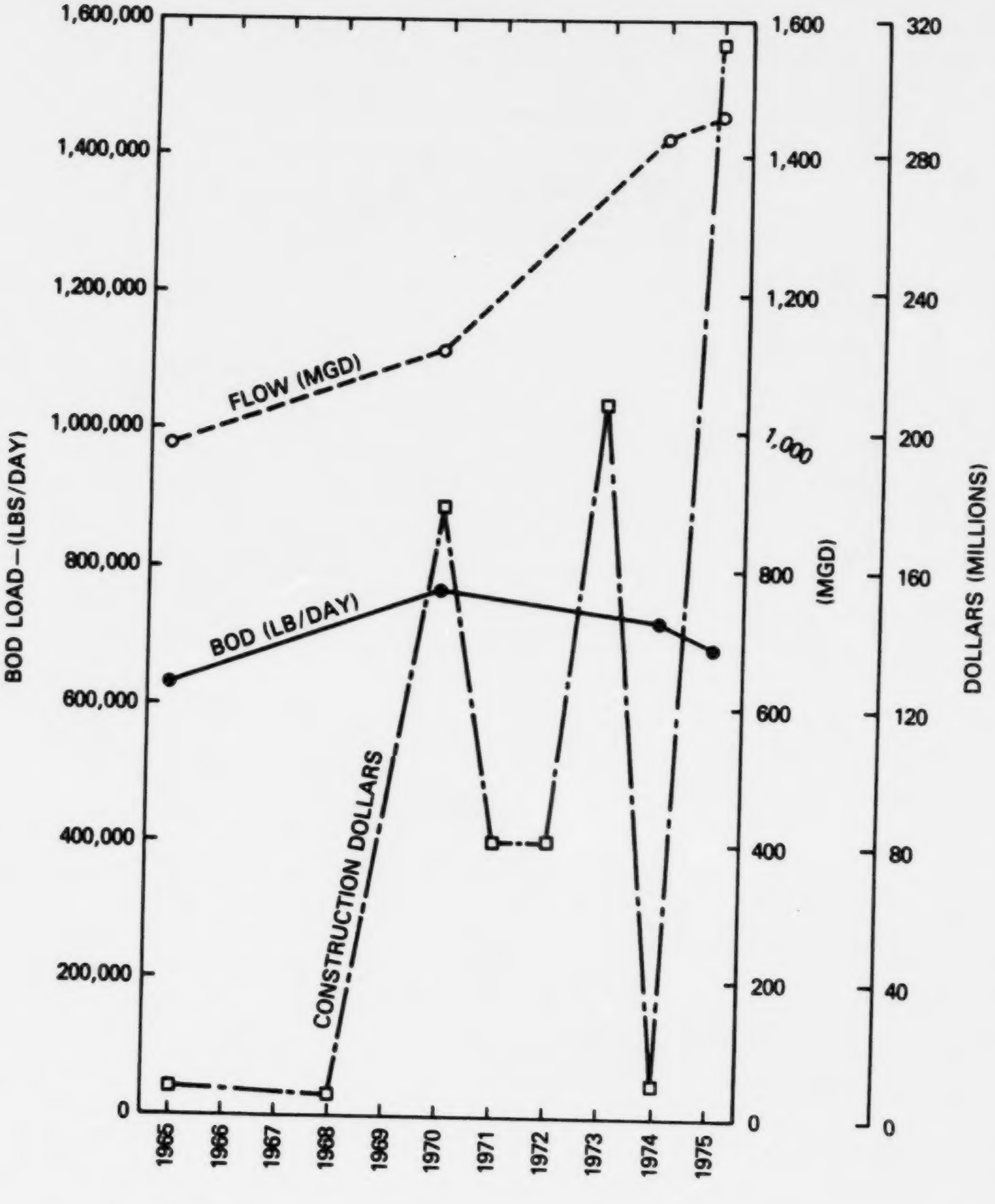
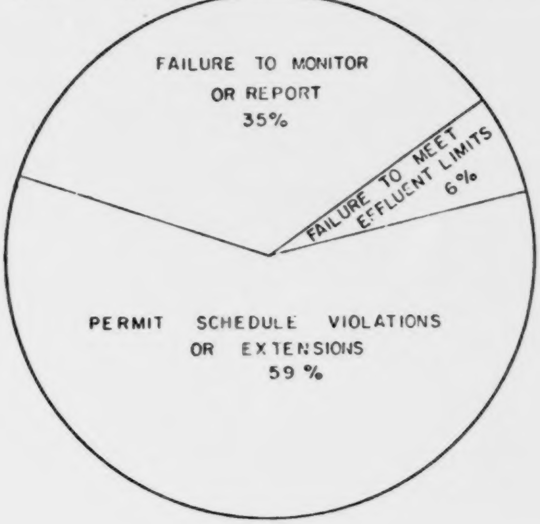


FIGURE 5

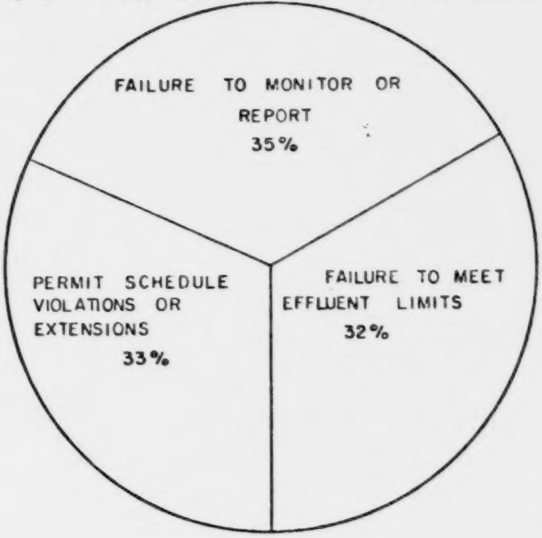
NPDES ENFORCEMENT ACTIVITY

EXCLUDES ENFORCEMENT NOTICES FOR NON-NPDES VIOLATIONS, SUCH AS ACCIDENTAL LOSSES, UNLICENSED WASTE HAULERS, SOIL EROSION, ETC.

1974 — 284 ENFORCEMENT NOTICES ISSUED



1975 — 699 ENFORCEMENT NOTICES ISSUED



How Much is This Going to Cost?

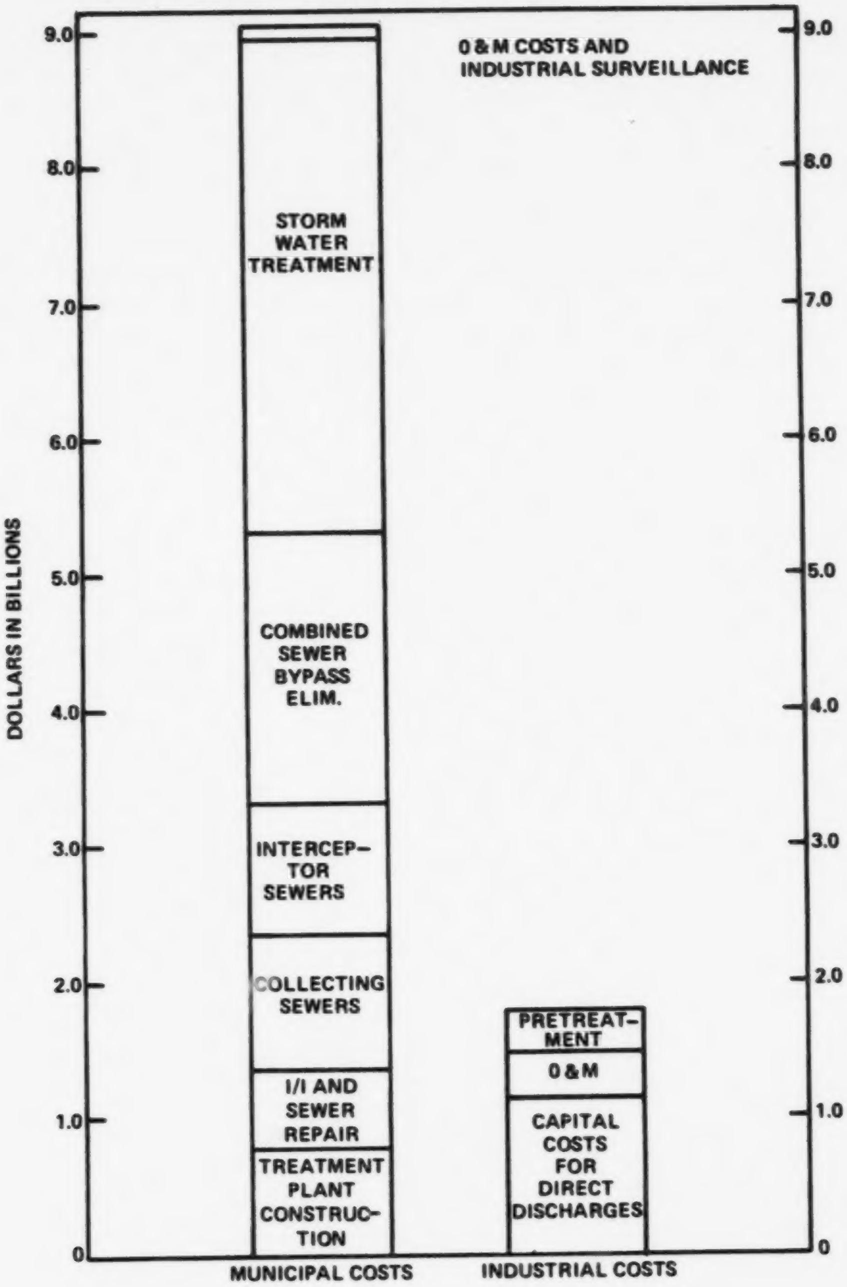
The costs of implementing PL 92-500 will be borne principally by municipal and industrial dischargers and regulatory agencies. Municipalities will generally be required to meet secondary treatment requirements, pass and enforce sewer ordinances, regulate industrial wastes in their system, revise user charges and establish cost recovery programs. Industries will also be required to meet effluent limitations, sample and analyze their wastes, and report regularly to the pollution control agencies. These agencies in turn must issue and enforce permits, award construction grants, conduct planning studies and meet other Federal requirements. A summary of these costs is shown in Figure 6.

It should be noted that PL 92-500 requires all discharges to provide a minimum level of waste treatment. Substantial expenditures are sometimes necessary to provide this minimum level treatment. In some cases these expenditures would not have been necessary to maintain Michigan's Water Quality Standards. Although Federal requirements may improve or maintain stream quality above the levels established in Michigan's Water Quality Standards, the expenditures may not improve the potential uses of the water (i.e., swimming, fishing, water supply). However, the policy of setting minimum treatment requirements does help to avoid the competitive advantage which occurs within industry groups when there are great differences in the ability of the receiving waters to assimilate wastes. In addition it provides a margin for industrial expansion and population increase in many cases.

The benefits of improved water quality are difficult to quantify. Many benefits are intangibles which cannot be assigned dollar values by traditional economic analysis. In general the benefits of pollution control include increased recreational opportunities, increased tourism, aesthetic improvements, reduction in treatment costs at public water supplies, reduced public health hazards, and increases in property values.

FIGURE 6

PROJECTED POLLUTION CONTROL COSTS 1974-1977



APPENDIX A
Summary - State of Minnesota

Complete copies of the State of Minnesota 305(b) Report can be obtained from the State agency listed below:

Division of Water Quality
Minnesota Pollution Control Agency
1935 West County Road B–2
Roseville, MN 55113

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Summary

This report provides an assessment of the water quality of the major rivers in Minnesota for the 1975 water year (October 1, 1974 to September 30, 1975).

Water quality conditions of 26 rivers plus Lake Superior are assessed in this report. The rivers are grouped and presented according to the eleven basin planning areas designated for Section 303(e) basin plans. Data for 13 significant water quality parameters are presented, discussed and compared with applicable state water quality standards. For the four major rivers - the Mississippi River, the Minnesota River, the Red River of the North, and the Rainy River-plots of river mile versus concentration of pollutant are also presented. The study used chemical and physical data from a total of 71 state monitoring stations in the STOrage and RETrieval (STORET) system. Primary network monitoring stations used in this report are normally located at points representative of the most critical reaches in a stream. Therefore, the average water quality of the stream as a whole will generally be better than the quality at specific monitoring stations.

The following specific information is given for each basin planning area: Background information, population, water uses, number of municipal and industrial point dischargers, specific water quality problems, and apparent trends. Probable causes of water quality problems and the current programs for pollution abatement are also discussed.

The existing water quality in each basin was compared with the national interim goal of the Federal Water Pollution Control Act. This goal states that "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983." In lieu of any further classification by EPA of what is meant by this objective, this goal is commonly equated to class 2B in the State of Minnesota water quality standards. Thus, the frequency of violations of the State 2B water quality standards is indicative of what areas and to what extent this goal has been achieved in Minnesota.

This study indicated that the majority of the rivers in the state are currently in conformance with this goal. However, large areas of particular rivers and a substantial number of localized areas presently appear to be in noncompliance with applicable water quality regulations and the interim goal. A total of six, or 22 percent, of the 27 waterways assessed in this report are considered to currently be in noncompliance with either the "fishable" and/or the "swimmable" aspect of the 1983 goal. Rivers or reaches of rivers placed in this category are the Crow River, the Cannon River, the Cottonwood River, the headwater tributaries of the Missouri and the Des Moines Rivers, and the Minneapolis-St. Paul Metro segment of the Mississippi River. It is emphasized that this is based on the average quality of all sampling stations on a river, and localized areas may reflect lower water quality or problems with specific parameters. This is discussed in the detailed assessment of individual rivers.

Assuming the current grant programs are continued at existing funding levels, it is expected that three of these rivers, or 11 percent of the total 27 rivers assessed, will not conform with the interim goal by 1983. These three rivers are: The Missouri and the Des Moines Rivers' headwater tributaries and the Metro segment of the Mississippi River. The reason for this projected inability of these rivers to conform with the goal by 1983 is primarily fiscal. In the Des Moines and Missouri Rivers headwater tributaries, increased funding is necessary to both upgrade inadequate municipal treatment facilities and implement rigorous non-point source regulatory controls. These two watersheds have particularly acute non-point source problems attributable to both agricultural activities and natural conditions. In the Twin Cities Metro segment of the Mississippi River, it appears that massive amounts of funds would be required to control or eliminate combined sewer overflows, to control urban runoff, and to better ensure the removal of pathogens from municipal treatment plants so that the swimmable aspect of the 1983 goal could be met.

On a statewide basis, available monitoring data indicates that some of the violations of applicable State water standards are caused by inadequately treated municipal and industrial point dischargers. The violations caused by point sources can be expected to be eliminated upon completion of upgraded municipal and industrial treatment systems. Industrial facilities are required to upgrade their treatment if they are currently in noncompliance with the applicable final affluent standards contained in their National Pollutant Discharge Elimination System (NPDES) permits. These final effluent standards are derived from the Federal requirements of "best practicable technology" (BPT), or for many of the industries in Minnesota the final limitation is based upon the more stringent state requirements. Pursuant to the Act, industries must provide "best available technology" (BAT) by July 1, 1983. This requirement to progress from BPT to BAT is expected to produce only a limited amount of improvement in overall water quality in Minnesota. Those detectable improvements will probably be apparent only in the receiving waters immediately below a few specific industries. This is based upon the location and relatively limited amount of heavy pollution orientated industries located in Minnesota and upon the relatively stringent state effluent standards already applied to industrial dischargers in Minnesota. Although specific cost figures are not available for industrial needs, it is estimated that industrial needs in Minnesota are less than $700 milllion (1973 dollars) or 50 percent of the total municipal needs in Minnesota.

In the municipal sector, municipal treatment facilities with construction needs are being delayed until Federal funds can be obtained by the community. Current levels of Federal funding for municipal wastewater treatment plants and the control of non-point sources are hopelessly insufficient when considered in relation to the total estimated needs in Minnesota. The 1974 Municipal Needs Survey of Minnesota indicates that the total municipal needs excluding stormwater treatment are approximately $1,385 billion (1973 dollars).

Even if all industrial and municipal point sources are brought into compliance, non-point loadings will continue to cause and contribute to many water quality problems in Minnesota. This is particularly apparent in the watersheds where agricultural activities are the dominant land use. There is a high probability that agricultural activities are adversely affecting the water quality in 75 percent of the State. The highest potential areas are the southcentral and southwestern sections of the State.

Another significant non-point source problem in Minnesota is inadequate septic tank systems. At present there are approximately 300,000 individual disposal systems in the state coupled with a continuing installation rate of approximately 10,000 to 12,000 units per year. Water quality problems associated with septic tank system failures include contaminated wells, sewage overflow on the surface and to surface waters, and increased fecal coliform concentrations in affected surface waters. The potential for these problems is at a maximum in shoreline developments and in the urban fringe areas where the construction of centralized municipal systems cannot keep pace with development.

In the Minneapolis-St. Paul Twin Cities Metro Area and in the other urban centers of the State, urban stormwater runoff is a major water quality problem. To alleviate this problem, housekeeping and detention and/or retention programs show the greatest promise for cost-effective water quality improvement.

Other significant types of non-point sources which impact water quality in Minnesota include silviculture, mining, residual waste disposal, construction activities, and dredging. The Minnesota Pollution Control Agency (MPCA) is actively involved in continuing statewide planning to develop programs for the control or abatement of non-point source pollution. Key programs in this effort include Section 208 regionalized planning, the Level B Study in the Twin Cities Metro Area, and the ongoing activities of the many local, State, and Federal agencies which have traditionally been involved in programs related to non-point source control.

The Soil Conservation Commission (SCS) has been involved in the field of non-point source control throughout its long history. The Commission's primary concern has been, and continues to be directed toward the control of erosion and sedimentation. The SCS has done an enormous amount of research in the area of erosion control. Based on its knowledge of erosion control, the SCS has estimated costs for non-point source control. The SCS is certainly not the only agency which does or will work on non-point source pollution control.

The cost to adequately control non-point sources of pollution from cropland and pastureland would total approximately $320 million (1975 dollars). At present levels of regulation funding, and manpower, this job will take some 50 to 100 years to complete. Another agricultural associated problem is the disposal of animal waste from cattle and swine operations. This work done by the SCS can be used in conjunction with work done by other agencies on non-point sources.

The SCS has estimated that programs which would noticeably improve water quality by reducing streambank erosion would require multimillion dollar expenditures, while corrective measures on lakeshore erosion are estimated at $400 million (1975 dollars). Similarly, the SCS estimated the cost of programs to correct erosion in roadside right-of-way areas at $15 million (1974 dollars.)

Annual cost estimates have also been developed for control of runoff from urban construction sites. Statewide annual costs are estimated at $6 million (1975 dollars), of which approximately $3.8 million is attributable to construction activities in the Twin Cities Metro Area.

Recommendations

This report makes the following recommendations:

1. If the interim goal of the Act for swimmable waters is to be achieved on a statewide basis in Minnesota by July 1, 1983 or, for that matter, by any later date, much more money must be allocated to plan and construct municipal wastewater treatment plants and to administer existing state programs.
2. In recognition of the water pollution control improvements which have been achieved and the initiative which has been demonstrated by the State regulatory agencies, it is recommended that the implementation of the provisions of the Act continue to be administered on the State level in conjunction with and in support of existing state programs.
3. The State 305(b) Reports should be required on a biennial basis rather than on the current yearly basis. State efforts could more profitably be channeled into more direct pollution abatement activities while still reporting progress every two years. Two-year intervals would also reflect more significant changes and apparent trends in water quality. This recommendation corresponds to the pending legislative recommendation of both the EPA and the Water Pollution Control Federation.
4. Regulatory controls on hazardous materials, specifically polychlorinated biphenyls (PCBs), should be implemented by banning or stringently restricting the use of such materials on a national level since State controls have already been enacted.
5. Additional funding should be allocated by the Federal government to the States for expanding additional monitoring activities. Such expanded programs would provide an improved data base for future 305(b) Reports and other water pollution abatement programs.

6. It is recommended that the U.S. Corps of Engineers commence a cooperative venture with the EPA and the Minnesota Pollution Control Agency to monitor and control the environmental effects of dredging on waters of the State in order to ensure compliance with applicable Minnesota water quality standards.
7. In order to meet the interim and subsequent goals of the Act throughout the entire State of Minnesota, local and Federal funds will have to be directed at the control of non-point sources. An adequate non-point source control program will require a close working relationship and increased funding for the many regulatory governmental agencies which are directly or indirectly involved in the control of non-point sources.
8. NPS pollution control is to a great degree dependeng upon an informed populous. Both urban and rural NPS pollution could be significantly lessened if each citizen understood how his actions ultimately affects the State's water quality. Funding should be allocated for information dissemination and public awareness programs. Education of the public in NPS control will not only be a cost-effective program but may also develop a greater ecological consciousness in each individual.
9. The EPA should continue to provide funds on a short-term basis to operate the tertiary wastewater treatment plant at Ely.
10. Funds should be allocated to support the "Clean Lakes" program as outlined in the Act. Minnesota developed a comprehensive, lake inventory which classifies lakes by eutrophic conditions based on available data. The continual updating of this inventory and additional Federal funding for the lake restoration program will be necessary for the continuation of a statewide lake improvement program.

APPENDIX A

Summary - State of Mississippi

Complete copies of the State of Mississippi 305(b) Report can be obtained from the State agency listed below:

Mississippi Air and Water Pollution
Control Commission
P.O. Box 827
Jackson, MI 39205

Section I: Conclusions and Recommendations

It has been stated that "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983". The water referred to here is defined as meaning any and all surface water systems which are confined, impounded, or free-flowing, and containing water for any period of the year. This literally includes tens of thousands of lakes, streams, ditches, and drainage canals, the majority of which are dry or nearly dry except during periods of heavy rainfall. Although these waters are required and projected to meet "fishable, swimmable" standards, it is ridiculous to believe that anyone is going to be able to fish and swim in a ditch which contains only a few inches of water.

Nevertheless, there are about 500 streams in the state, inlcuding these small streams, tributaries, and ditches, which are not considered to be meeting the "fishable, swimmable" standards. If it is assumed that there are at least 25,000 streams, lakes, tributaries, and ditches within the State, then 98 percent of these waters are currently meeting fishable, swimmable standards.

However, if the small tributaries and ditches which have no potential for fishing or swimming are excluded from this estimate of total streams, the list contains only about 1,000 bodies of water. Of this list, only about 78 (about 8 percent) are considered to be not meeting "fishable, swimmable" standards. These streams should be the major focus of attention in future control programs, although it will be the goal to address the entire 500 streams not meeting applicable standards.

There are indications of streams in the State in which it can definitely be said that the violations of water quality are not man-made. These streams include the upper reaches of Jourdan River and Black Creek in south Mississippi. Measurements of pH have been recorded with values ranging from 3.5 to 5.5, all of which are below the pH standard for fish and wildlife streams.

Since there are no discharges into this segment, the unusually low pH measurements have been attributed to the low pH of groundwater, highly acidic soil conditions, and the runoff from swampy areas where tannic acid production is allowed to build up. Indeed, the lowest pH values recorded have been during and after a heavy rainfall incident.

Acidic soil conditions and dense pine tree forest are quite common throughout the southern portion of Mississippi, causing most streams in this area to be naturally acidic. However, no other stream other than the Jourdan River is known to be so consistently and grossly in violation of the normal pH values. This one case constitutes about 0.1 percent of the total streams in the State in which natural conditions alone cause violations in water quality standards.

The State of Mississippi has been in the past, and is now, basically a rural state. The urban-industrial complex, with which massive pollution is most often associated, exists only in one area of the State; that being the eastern portion of the Mississippi Gulf Coast. Although several urban type areas exist within the State, pollution problems resulting from this urbanization are relatively insignificant.

Section II: Goals and Objectives

Introduction

A total of 75 streams do not meet "fishable, swimmable" standards at the present time due to human influence. Of these streams, only Tallahalla Creek at Laurel and Escatawpa River at Moss Point may be unable to meet the goals of 1983 because of human influence. On the basis of an assumed total of 1,000 streams in the State, this is less than 0.2 percent. The reasons, as mentioned in Chapter IV, are due to specific industrial discharges which treat to current best applicable technology levels and still violate the dissolved oxygen standard. Until technology can develop better means of treatment which are economically achievable, exceptions to "fishable, swimmable" standards will probably be maintained.

As stated previously, the 75 streams referred to above are streams which could be used for fishing and/or swimming most of the time, if it were not for human influence. If the dry ditches are included, the estimate of total number of streams in the State has been placed at 25,000. Including the municipal and domestic discharges into these dry streams, it is estimated that about 200 of these discharges will not meet "fishable, swimmable" standards by 1983, due in most cases to a lack of available funds. This represents about 0.8 percent of the total number of streams in the State (based on 25,000) in which human influence will prevent attainment of "fishable, swimmable" standards by 1983.

The streams in the State in which natural conditions will preclude fishing and/or swimming in 1983 due to low pH values caused by acidic soil conditions and runoff from swampy pine forest areas constitute less than 0.1 percent of the total number of streams in the State, (based on 1,000 total streams).

Whether a basis of 1,000 streams (those actually "fishable" and/or "swimmable") is used or 25,000 streams (including all tributaries and ditches), it can be stated that over 99 percent of the streams in Mississippi are projected to meet the "fishable, swimmable" standards by 1983.

Recent Improvements

Since the adoption of PL 92-500, Mississippi municipalities have received over 40 million dollars in Federal grants and 16 million dollars in State loans for planning and construction of wastewater treatment facilities. Major cities in which new sewage treatment plants have been built in recent years include Jackson, Biloxi, Greenville, Hattiesburg, Vicksburg, Greenwood, Natchez, Oxford, Corinth, Yazoo City, Brookhaven, and Grenada.

Probably the largest single improvement in the State resulting from control programs has been the start-up of the new Jackson treatment plant and subsequent removal of several raw sewage discharges into the Pearl River. Although it is too early for monitoring data to reflect any changes in water quality, improvements in the Pearl River are visibly noticable. Similar improvements have resulted in Greenville, Vicksburg, and Natchez, where raw sewage, previously dumped into the Mississippi River, is now being treated by modern activated sludge facilities.

Proper treatment of industrial waste such as Masonite Corporation on The Tallahala Creek, Bryan Brothers on Tibbee Creek, and numerous light to heavy industries on the Escatawpa River have also contributed substantially to the improvement of the State's waters.

Hundreds of industries have spent millions of dollars in an attempt to comply with the orders and programs of the Mississippi Air and Water Pollution Control Commission and the United States Environmental Protection Agency (EPA). Where specific limitations on wastewater effluents could not be achieved, large holding ponds, recycle systems, spray-irrigation systems, and controlled release programs have been required, thus keeping those effluents out of State waters altogether. Specific reductions in pollutants due to control measures of major discharges are shown in the appropriate basin analysis. Because historical stream data below many of these discharges is non-existent, measured improvements in the stream quality is difficult. However, the comparison between present effluent quality and effluent quality prior to taking control measures speak for themselves.

Recommendations

As was stated in the study, there are about 500 streams, tributaries, and ditches which do not presently meet "fishable, swimmable" standards. Of this 500, only about 75 of them actually have the potential for fishing or swimming. This report recommends that a concentrated effort, both at the State and Federal level, be made to achieve "fishable, swimmable" standards in only those streams which may ever be used for this purpose, and that the other streams which are normally dry with the exception of the small amounts of wastewater which are discharged to them, be controlled only to the level that they do not become a visible nuisance or health hazard.

It is believed that this goal can be realistically achieved, with the few exceptions mentioned in this chapter; but only with sufficient funding. It is thus recommended that increased Federal and State money be allocated to Mississippi toward this goal.

Effects Of Control Programs On Water Quality

- **Point Source Control**

The NPDES program assumed by the State in May, 1974, now serves as the vehicle for point source pollution control. Through this program, water quality improvement is achieved by requirement of a sufficient degree of treatment to meet water quality standards. Waste load allocations determine maximum allowable effluent concentrations such that natural recovery of the receiving stream is initiated. In that municipal treatment plant discharges represent the majority of the problem areas in the State, EPA funding of both new construction and upgrading of existing facilities through the Section 201 Facilities Planning process is extremely significant to water quality improvement goals. Continuing progress is ensured through planning and construction schedules, compliance monitoring, ambient trend monitoring, and special stream studies.

- **Non-point Source Control**

Recent initiation of control programs and pending action summarize progress to date regarding non-point source control. Areas of current concern include:

1. The Mississippi Delta region in the northwestern portion of the State where agricultural runoff in the form of pesticides and herbicides has adversely affected many lakes and streams to fishing.
2. The Mississippi Gulf Coast and Jackson, Mississippi urban areas where urban runoff may be significant to the water quality of nearby receiving streams and bodies of water.

A program to eliminate all sump discharges and/or discharges from storage containers of pesticides or herbicides by aerial applicators in the Delta has been formulated and has as its target implementation date the 1976 application season.

A plan of study has been adopted and work initiated to somewhat define and quantify the urban runoff from Jackson, Mississippi, with plans to follow with similar work on the Gulf Coast in the Gulfport-Biloxi area.

APPENDIX A
Summary - State of Missouri

Complete copies of the State of Missouri 305(b) Report can be obtained from the State agency listed below:

Clean Water Commission
Capital Bldg., Box 154
Jefferson City, MO 65101

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Summary

Point Source

The number of National Pollutant Discharge Elimination System (NPDES) permits issued has been increasing each year in the past four years. Table I illustrates this fact and shows the total number of non-municipal and municipal permits issued as of the end of 1975.

TABLE 1

NPDES PERMITS ISSUED

	Non-municipal		Municipal		
	Major	Minor	Major	Minor	Total
Fiscal Yr. 1973	8	1	0	0	9
Fiscal Yr. 1974	26	234	32	201	493
July 1, 1974 – Jan. 1, 1975	13	365	60	248	686
Jan. 2, 1975 – Jan. 1, 1976	3	1,022	0	48	1,073
Total	50	1,622	92	497	2,261

Trends in NPDES permits issued indicate that most major municipalities and industries now hold permits since only three major industrial and no major municipal permits were issued in calendar year 1975. It appears that small industries and commercial establishments which discharge less than 0.05 MGD and have no special effluent problems will account for most of the new permits issued in the near future as they have in 1975.

In 1975, 375 letters of approval for construction or operation of waste control facilities for feedlots were issued. Since the beginning of the program in 1970, 1,114 such letters have been written.

In order to achieve the 1977 goals set forth in PL 92-500, the following will be of concern.

1. Construction and upgrading of approximately 91 percent of municipal treatment plants.
2. Construction of and upgrading of an estimated 75-85 percent of non-municipal treatment plants.
3. Construction of waste control facilities for an unknown number of feedlots.

Non-point Source

Pollution derived from non-point sources has in the past not been given the same importance value as has been given to point-source pollution. The result is that few programs for the control of non-point source pollution presently exist. With area-wide 208 planning, it is our intention to identify agriculturally and silviculturally related sources of pollution and to initiate processes which will check this pollution. Definite plans should be formulated by July, 1978.

Water Quality Standards Violations

There are 39 violations (Table 2) of water quality, with respect to intended use, in six of the eight basins delineated. Most violations (18) occurred in the lower Missouri River where runoff, sanitary sewer overflow, municipal, private, and industrial wastes contributed to high fecal coliform counts. Even violations were present in the Grand-Chariton basin where high fecal coliform and high iron and manganese concentrations result from land runoff. The violations (4) within the Mississippi River basin have been attributed to high fecal coliform concentrations at three stations and high manganese concentration at one station which have resulted from municipal, private, and industrial waste and land runoff. High flow and effluents contribute to high fecal coliform concentrations at three stations in the Osage-Gasconade basin. The Salt River basin shows two violations of criteria because of high concentrations of iron and high fecal coliform concentration with high flow, high turbidity, runoff and municipal waste effluents all contributing. One specific problem area exists in the White River basin where extremely low dissolved oxygen concentrations result from municipal waste effluent.

From Table 2 it is apparent that areas with violations exhibit compound problems. Our most urgent problem appears to be caused by non-point source runoff, creating high fecal coliform concentrations. Another serious area of concern is the degradation caused by municipal, private and industrial point source pollution combined with non-point source runoff. Point source pollution is presently being dealt with through the NPDES permit program and the State, through 208 area-wide planning, is setting up a broad-based plan in order to approach the non-point source pollution problem.

TABLE 2

WATER QUALITY STANDARDS VIOLATIONS

Cause	Fecal coliform	Fecal coliform and manganese	Iron and manganese	Manganese	Iron	Dissolved oxygen	Total
Municipal and industrial point sources						1	1
Municipal, private, industrial point sources	6						6
Non-point runoff	12	2	2	1			17
Municipal point source and runoff	4				1		5
Municipal and private point sources and runoff		1					1
Municipal, private, and industrial point source and runoff	9						9
Total	31	3	2	1	1	1	39

Water Uses

Water uses are ranked in Table 3 as percentages of the total water usage.

TABLE 3

WATER USES AS PERCENTAGES OF THE TOTAL WATER USAGE

Water use	Percentage of total water usage
Propagation of warmwater fisheries	17.7
Fishing	17.7
Livestock watering	15.8
Boating	12.2
Drinking water supply	12.1
Irrigation	11.7
Whole body water contact recreation	11.4
Propagation of coldwater fisheries	1.4

Although whole body water contact recreation does not make up a large portion of the total water usage, most violations of water quality criteria fall under this use. The fact that whole body water contact recreation makes up the largest percentage of violations reflects the great number of instances of high fecal coliform concentrations, previously stated as the most prevalent water pollution problem. Some violations for other water uses with large percentages of the total water use are also related to high fecal coliform concentration,' although specific variables are necessarily considered for each water use with various criteria selected accordingly.

1983 Goals – Swimmable Water

Because of natural conditions in the plains region of Missouri, north of the Missouri River, many streams and rivers will never be adequate for whole body water contact recreation. Little percolation of water into hardpan clay soils results in erosion and runoff problems. Waterways in the plains are highly turbid and very shallow with a mud or muck substrate. Enforcement of water quality standards will assure that all streams and rivers within the State which are presently suitable for swimming will continue as such and will meet 1983 goals.

Cost Estimates

- **Point Source**

The estimated cost of total needs for construction of publicly owned wastewater treatment facilities in order to meet 1983 goals (in terms of 1973 dollars) is $2.3 billion. The portion of this which has been committed through fiscal year 1976 is $419.8 million, or $104.9 million per year. In terms of the original estimate (and inflation of 4.6 percent or less), if this amount is spent yearly, it will take 21.9 years to meet 1983 goals.

- **Non-point Source**

The U.S.D.A. Soil Conservation Service (1970) estimated cost for erosion control is $498.8 million, of which $35.0 million has been spent in the last 5 years (through 1974). At this rate of expenditure, based on the erosion control needs, calculations indicate that 65-70 years will be needed to achieve the desired results.

APPENDIX A
Summary - State of Montana

Complete copies of the State of Montana 305(b) Report can be obtained from the State agency listed below:

Water Quality Bureau
Environmental Sciences Division
Department of Health and Environmental Sciences
Cogswell Building
Helena, MT 59601

Summary

The total mileage of Montana streams is not known. About 4,000 miles of Montana's streams do not meet the 1983 goals. We have interpreted the goals to mean waters suitable for all beneficial uses. About 100 miles of these streams will probably meet the 1983 goals due to improvements in point discharges. This leaves about 3,800 miles of Montana streams that will not meet the objectives of the act. Of these 3,800 miles, about 500 miles are degraded primarily by natural causes.

A sediment control project is being developed to deal with the 2,500 miles of streams degraded by sediment. At the present time it is impossible to predict the cost or effectiveness of the program.

Prospects for controlling dewatering are very slight at the present time so the approximately 900 miles degraded by dewatering will not meet the goals of the Act. Salinization also appears to be noncontrollable, so 1,400 miles of streams will continue to be degraded by excessive salts.

Going from best available technology to best practicable technology will have essentially no impact on water quality in Montana. The cost associated with BPT in Montana is unknown.

APPENDIX A
Summary - State of Nebraska

Complete copies of the State of Nebraska 305(b) Report can be obtained from the State agency listed below:

Water Quality Section
Water Pollution Control Division
Department of Environmental Control
P.O. Box 94653
State House Station
Lincoln, NB 68509

Abstract

The objective of the Water Pollution Control Act Amendments of 1972 (PL 92-500) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Major goals declared in order to achieve this objection include: (1) the discharge of pollutants into the navigable waters be eliminated by 1985; and (2) that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water by July 1, 1983. Through the monitoring, surveillance, permits and enforcement programs, and proper planning, the work toward pollution abatement can take place in an orderly and economically feasible manner.

Further application of PL 92-500 (continued Federal funding for construction grants to control point sources) should aid in reaching these objectives and in restoring, maintaining, and enhancing quality of water in Nebraska. In addition, a positive attitude, as well as funding, will be needed from Federal, State, and local governments to work towards solution of non-point source problems. Should existing programs be slighted or cut, the water quality could be degraded to the point of being economically or physically irretrievable.

Table A-1 in Appendix A of the report delineates the basins of the State which exhibit major problem areas. The streams, or parts thereof, are cited, followed by problem(s), possible cause, and comments for clarification.

A comparison of water quality monitoring data before and after January 1974 was performed to determine recent trends in water quality. Table A-2 in Appendix A lists, by basin, the dissolved oxygen patterns. Lack of precipitation in 1974 and 1975 hindered any valid conclusions on the trends of water quality directly due to pollution control but there is a strong indication that these controls have brought about improvements, especially in the Papillion Creek Watershed and in Salt Creek.

Natural conditions preclude two to three percent of the State's waters from meeting "fishable, swimmable" goals with approximately 70 percent now attaining the recommended criteria. Due to the scarcity of information and the lack of moisture in 1974 and 1975, these estimates may not be accurate.

Assuming progress toward enhancing the waters of the State will continue, an estimated 85 percent of Nebraska's waters should meet the goals of PL 92-500 by 1983. Future trends in non-point source pollution control will influence that percentage.

The point source control program is accomplishing the task of improving and maintaining the quality of Nebraska's waters. The attainment of secondary treatment by 1977 for municipal dischargers remains dependent of financial and technical resources. Achievement of secondary treatment needs the flexibility to be delayed on a case-by-case basis. Most industrial dischargers are expected to attain best practicable technology by 1977 and best available technology by 1983.

Agricultural runoff constitutes the primary source of non-point source pollution. Erosion and deposition of sediment are major land and water resource problems in the State. Voluntary erosion control programs have not been totally successful. Therefore, it is apparent that some sort of a combination of voluntary/mandatory system may need to be developed. An accelerated conservation treatment program for the Platte River Basin only has been suggested with total costs expected to be about $119 million over a fifty-year period (Platte River Basin-Nebraska Level B Study, "Water Quality" Technical Paper.)

Meeting the water-quality goals of PL 92-500 has required vast expenditures by all levels of government and by private industries. Total costs for municipal wastewater facilities in Nebraska, based upon the most recent needs survey, are estimated to exceed $985 million while total cost for industries top $250 million. Until more non-point pollution sources have been identified, total costs cannot be estimated for controlling that source. It is difficult and, at times, almost impossible to put a dollar value on the benefit of clean water in the State of Nebraska.

APPENDIX A
Summary - State of Nevada

Complete copies of the State of Nevada 305(b) Report can be obtained from the State agency listed below:

Environmental Protection Section
Department of Human Resources
1209 Johnson St.
Carson City, NV 89701

Summary

The attainment of Nevada's water quality standards, which already embody the national 1983 water-use goals (i.e., fishable and swimmable waters), must be based upon additional controls of pollutants from point sources with diffuse origins and non-point sources. The foundation of Nevada's program for the control of such sources is the planning and implementation activities mandated by Section 208 of the Federal Water Pollution Control Act, as amended.

As a basic technical approach to the control of non-point and analagous point sources, the State will promote the selection and implementation of best management practices, as opposed to capital-intensive treatment structures. A tandem effort is the evaluation and development of institutional systems to administer the technical control measures. This latter effort is well underway as it applies to most kinds of non-point and analagous point sources. It now stands the test of implementation.

The need for additional control of pollutants from non-point and analagous point sources stems from an analysis of the extent to which water quality of Nevada's six major hydrologic areas conforms presently with the national 1983 water-use goals. The goals in five of the areas are found to be either impaired or are close to being impaired. In this regard, phosphates, total dissolved solids, temperature, turbidity, and siltation are the water pollution constituents of principle concern. The major kinds of causes include low flows, irrigation, treated sewage discharges, urban runoff, stream bank vegetation removal, watershed erosion, and channelization.

Standing in contrast to the preponderance of Nevada's water quality problems, the Federal water pollution control program presently emphasizes the control of municipal and industrial point sources. In this context, Nevada stands well. For example, all but two industrial discharges have ceased; the remaining two will apply the best practicable control technology currently available, in accordance with Federal requirements. As for municipal discharges, half will soon achieve effluent limitations based on secondary treatment, as defined by the United States Environmental Protection Agency. More important, the wastes of 92 percent of Nevada's sewered population are presently treated in accordance with Federal requirements.

Also, Federal legislation sets forth, as a goal, that the discharge of pollutants be eliminated by 1985, although the legislation contains no requirements for attaining the goal. It is a goal that is not embraced by the State of Nevada. The removal of all pollutants from discharges would be prohibitively expensive, and, in most cases, would result in less flowing water. This in turn would worsen many existing water quality problems and impede attainment of the 1983 goals.

The 1985 goal does not recognize, and the Federal emphasis on municipal and industrial effluent limitations does not adequately account for, non-point sources, and analagous point sources, low flows, and many of the other water pollution factors predominant in Nevada.

APPENDIX A

Summary - State of New Hampshire

Complete copies of the State of New Hampshire 305(b) Report can be obtained from the State agency listed below:

Water Supply and Pollution Control
Commission
105 Loudon Road
Prescott Park
Concord, NH 03301

Introduction and Summary

Water Quality Problems

The State of New Hampshire is divided into five major basins for the purpose of water quality management planning. These basins are the New Hampshire portions of the:

Androscoggin River Basin
Merrimack River Basin
Connecticut River Basin
Piscataqua River and Coastal New Hampshire Basins
Saco River Basin

Major water quality problems by basin are as follows.

- **Androscoggin River Basin**

The Androscoggin River below Berlin is one of the most polluted streams in the State of New Hampshire, due primarily to industrial waste discharged by the Brown Paper Company in Berlin. This is further aggravated by the discharge of untreated domestic sewage from the City of Berlin (1970 population 16,12) and the Town of Gorham (1970 population 3,364).

During 1979, all wastewater from the Brown Company and the domestic wastes from Berlin and Gorham will be treated with the equivalent of secondary treatment.* The Androscoggin River is then anticipated to be upgraded in quality to at least the level required by the legal classification fixed by the New Hampshire Legislature, namely "C" from Berlin to the Maine-New Hampshire State line.

All municipalities above Berlin, including Errol and Milan and other small settlements along the river, are served by sub-surface systems. Point sources of pollution from individual systems have been determined but no serious pollution problems exist in the upper part of the New Hampshire portion of the Androscoggin River Basin.

While the population affected by the water quality problems of the basin is relatively small, the magnitude of the problems is significant.

- **Merrimack River Basin**

Untreated wastes from municipal and industrial sources make up the bulk of the water quality problems of the Merrimack River Basin, below Franklin. Above Franklin, the water quality of the Pemigewasset River has improved markedly from a nuisance condition to Class "B" over the last six years with the construction and operation of municipal treatment plants in Lincoln, North Woodstock, Plymouth, Ashland, New Hampton and Bristol and the industrial treatment plant for the Franconia Paper Corporation at Lincoln, coupled with the subsequent closing of the Franconia Paper Corporation, Lincoln, in April 1972, and the Ashland Paper Company, Ashland, in August 1969. The New England Pulp and Paper Company at Lincoln purchased the former Franconia Paper Corporation plant from a subsequent owner, the Profile Paper Company, in 1975, and is presently recycling its wastewater, thus avoiding any river pollution.

The following are specific problem areas in the Merrimack River Basin.

a. Domestic Sewage Discharges
Tilton-Northfield (part of the Winnepesaukee Basin Project); Franklin (part of the Winnepesaukee Basin Project); Concord (treatment plant in Penacook recently completed, but Concord still discharges untreated domestic waste directly into the Merrimack River); Allenstown-Pembroke (combined sewerage system and plant is currently under construction); Manchester (to include parts of Londonderry, Auburn, Bedford and Goffstown; joint plant is under construction); Nashua-Hudson (joint plant is planned); and Pittsfield (facilities design being prepared).

b. Industrial Discharges
USM Corporation-Boxboard Division, West Hopkinton (construction of treatment plant nearing completion); Granite State Packing Company, Manchester; Seal Tanning Division of Ohio Leather Company, Manchester; Waumbec Dyeing and Fishing Company, Manchester; Hampshire Chemical Company, Nashua; Mohawk Associate (tannery), Nashua; and several smaller industries in Manchester, Henniker, and Pittsfield.

All the above domestic and industrial waste discharges will be abated by updating existing treatment plants, or the construction of new treatment plants as appropriate, and the receiving waters will be upgraded to their legal classification.

There are domestic wastes problems in the southeastern portion of the basin due to large population growth and limited surface waters into which treated waste can be discharged.

This has been designated a Section 208 areawide waste treatment management planning area.

To prevent any possible future degradation of Lake Winnipesaukee, the entire drainage area of the

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*This treatment also corresponds to best practicable technology (BPT).

Winnipesaukee River above its mouth in Franklin has also been designated a Section 208 areawide waste treatment management planning area.

- **Connecticut River Basin**

The major sources of pollution are attributable to the following communities and industries.

a. Domestic Sewage Discharges
   Lebanon (treatment plant now under constructions); Claremont (outdated plant needs to be replaced); Keene (outdated plant needs to be replaced); and Hinsdale (no plant at present).

b. Industrial Discharges
   Groveton Paper Company, Groveton; Claremont Paper Mills (Bemis Company), Claremont; Dartmouth Woolen Mills, Inc., Claremont; Troy Mills, Inc., Troy; Homestead Woolen Mills, Inc., West Swanzey; A.C. Lawrence Leather Company, Winchester; Paper Service Mills, Inc., Winchester; Ashuelot Paper Company, Winchester; Hinsdale Products Company, Hinsdale; and G.E. Robinson and Company, Hinsdale.

In addition to the above major wastewater problems, there are lesser problems caused by untreated domestic wastes from the towns of Bethlehem, Lisbon, Woodsville, north portion of Charlestown, North Walpole, Walpole and Winchester.

All of the above discharges will be abated by updating existing treatment plants or the construction of modern treatment plants.

- **Piscataqua River and New Hampshire Coastal Basins**

Although several municipalities presently have treatment facilities in operation, upgradings or expansions are necessary in several of the larger communities. The following are critical areas.

a. Domestic Sewage Discharges
   Milton (on Salmon Falls River); Rochester, East Rochester, Gonic (on Cocheco River); Dover (on Cocheco River); Portsmouth (plant expansion and upgrading necessary); and New Castle (connect to Portsmouth).

b. Industrial Discharges
   Milton Leather Company, Milton; Spaulding Fibre Company, Milton and North Rochester; and General Electric Company, Somersworth.

Other point sources on basin tributaries are causing a lesser degree of pollution. Local problems exist in the towns of Raymond, Newfields, Newington and Greenland which have experienced instances of sub-surface systems failures. Many other smaller groupings of recreational areas of Rye and around Dover and Portsmouth may possibly be contributing to occasional high counts found by the Commission's staff which operates an effective estuarine monitoring program.

There are also domestic wastewater problems developing in the southern tier of towns of the basin due to rapid population growth and limited surface waters into which treated waste can be discharged.

- **Saco River Basin**

The problems of the New Hampshire portion of the basin are in North Conway, a small area in Conway, and the Center Ossipee section of the Ossipee River (a tributary). The problems in North Conway are associated with failing subsurface systems in the Pequawket Pond-Page Randall Brook area which will be alleviated by completing the planned sewerage system and discharging the collected wastes to the Conway Municipal Treatment Plant. The solution of the Center Ossipee problem will require upgrading an old treatment facility as well as extension of the collection system to enable a few areas to be treated that are currently being served by failing sub-surface systems.

The only industry in the New Hampshire portion of the Saco River Basin which presents a water quality problem is Kearsarge Metallurgical Corporation, located on Pequawket Pond in Conway. The wastes from this industry will be discharged to the Conway Municipal Treatment Plant within 30 days of completion of the collecting sewer serving the area in the vicinity of the plant.

Present and Future Water Quality

As a result of the above listed water quality problems, the present quality of many of the larger surface waters are below desired levels. Figure 1 and Table 1 delineates the approximate present or existing quality of the rivers of New Hampshire. Figure 2 indicates the legal classification of surface waters and represents the desired water quality of the rivers in New Hampshire. The uses assigned to each class are outlined in Table 2. Note that over 99 percent of the rivers of New Hampshire are required by State statutes to meet the goals of "fishable", "swimmable" waters intended in the Water Pollution Control Act. Several segments on principal rivers are presently degraded to D or lower. The causes of such extreme degradation are known and the necessary abatement measures are given high priority so that the goals of the Act will be attained within a year or two of the schedule set up by the Act. Where classified as B, the segment presently of C quality will also be upgraded to B quality (or B* Quality - see Table 3) by the control of known point and non-point sources of pollution.

Abatement Measures

All known significant point sources of pollution have been issued National Pollutant Discharge Elimination System (NPDES) permits. These permits indicate the necessary abatement measures to be taken to meet the required water quality goals of both the State and Federal governments. Continued emphasis is on construction of municipal and industrial water pollution control facilities. Major emphasis is also placed on the sub-division and sub-surface systems programs. This program involves review and approval of systems to protect the surface waters and groundwater of the State.

Lakes

Most lakes of New Hampshire are B quality or better and are "fishable-swimmable" except for those lakes with marshy shores and boggy bottoms. At present there are 23 lakes of twenty acres or more that are classified as eutrophic. In the future there is to be no discharge of any point nutrient sources into the lakes of New Hampshire. Where possible, non-point sources will also be controlled by appropriate preventive measures.

Non-point Sources of Pollution

Non-point sources of pollution include a generalized type of pollution such as that caused by agriculture activities (including pesticides and fertilizers), timber cutting activities, construction undertakings, uncollected runoff from built-up areas, and the like. A non-point source strategy addresses the means of controlling such activities so that they will not degrade the surface waters and groundwater of the State. At present, the more obscure types of non-point sources are masked by much of the point pollution sources.

Cost of Achieving Future Goals

The approximate costs for municipal treatment facilities required to achieve the future intended uses of the streams of New Hampshire were submitted as the "1974 Needs Survey". The adjusted figures from this submission for the New Hampshire portions of the listed river basins are:

Androscoggin River Basin	$ 31,554,000
Merrimack River Basin	545,744,000
Connecticut River Basin	103,456,000
Piscataqua River and Coastal N.H. Basins	117,805,000
Saco River Basin	21,038,000
Total for the State	$ 819,517,000

FIGURE 1

EXISTING WATER QUALITY

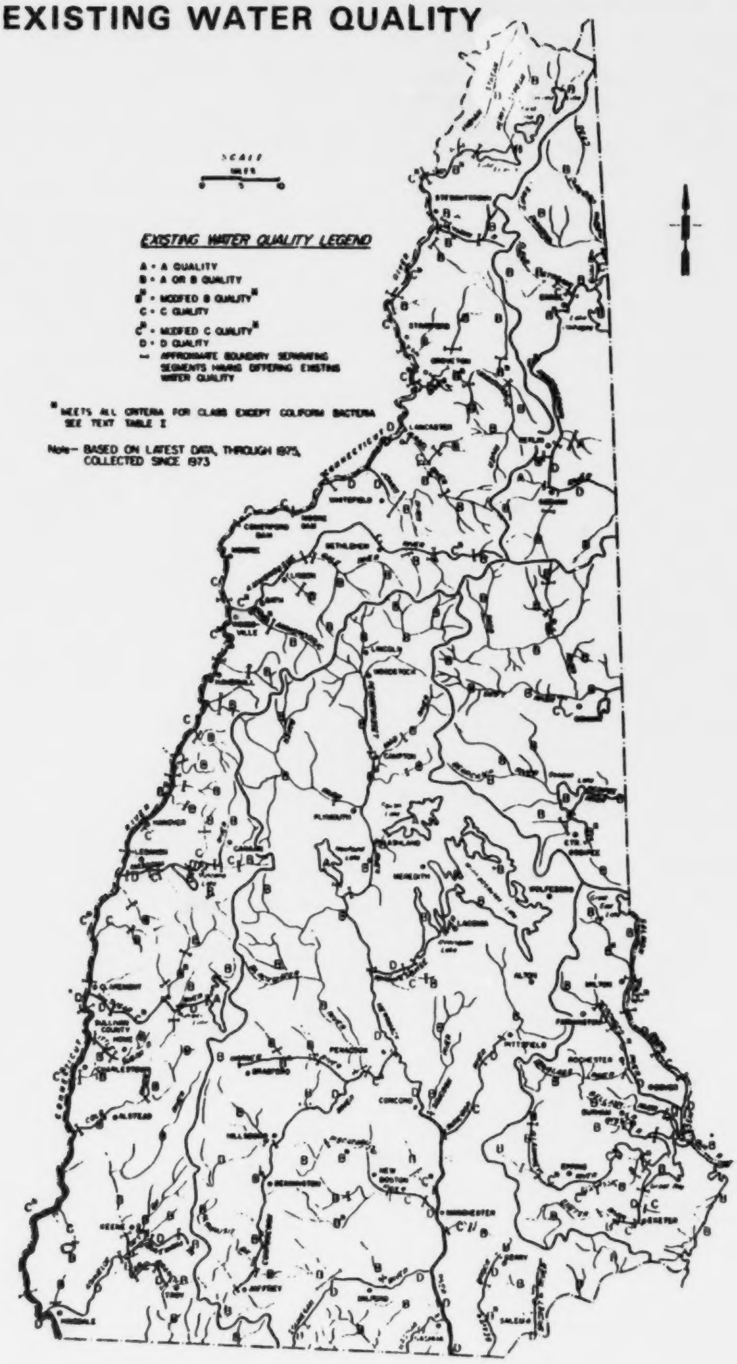
SCALE
MILES
0 5 10
EXISTING WATER QUALITY LEGEND
A = A QUALITY
B = A OR B QUALITY
B* = MODIFIED B QUALITY*
C = C QUALITY
C* = MODIFIED C QUALITY*
D = D QUALITY
— APPROXIMATE BOUNDARY SEPARATING SEGMENTS HAVING DIFFERING EXISTING WATER QUALITY
* MEETS ALL CRITERIA FOR CLASS EXCEPT COLIFORM BACTERIA SEE TEXT TABLE I
Note— BASED ON LATEST DATA, THROUGH 1975, COLLECTED SINCE 1973
CONNECTICUT
WHITEFIELD
LANCASTER
BETHLEHEM
CONCORD
MANCHESTER
A
B
C
D

TABLE 1

STATE OF NEW HAMPSHIRE 305(b) WATER QUALITY INVENTORY SUMMARY OF SELECTED STREAMS

River basin or coastal drainage (including main-stem and major tributaries)	Total miles of selected streams	Miles *now* meeting Class B (fishable/swimmable)	Miles expected to meet Class B by *1983*	Miles *now* meeting State WQ standards	Miles *not* meeting State WQ standards	Water quality problems	Point source causes of WQ problems M=Municipal I=Industrial D=Individual domestic	Non-point source causes of WQ problems 1=major 2=minor
Androscoggin	98	75	82	75	23	Note 1, plus foam, floating solids	M, I (paper mill)	2
Merrimack	448	287	419	297	151	Note 1	M, I, D	2
Connecticut	457	150	444	150	307	Note 1	M, I. D.	2
Piscataqua and Coastal	183	85	183	85	98	Note 1	M, I. D	2
Saco	94	94	94	94	0	–	–	2
Total (mileage)	1,280*	691	1,222	701	579			
Total (%)**	100%	54.1%	95.5%	54.8%	45.2%			

NOTE !:
Low DO, high bacteria, high turbidity, suspended solids.

*Represents 8.8% of the 14,544 miles of identified streams in New Hampshire.
**% of total miles of selected streams.

FIGURE 2

CLASSIFICATIONS OF SURFACE WATERS

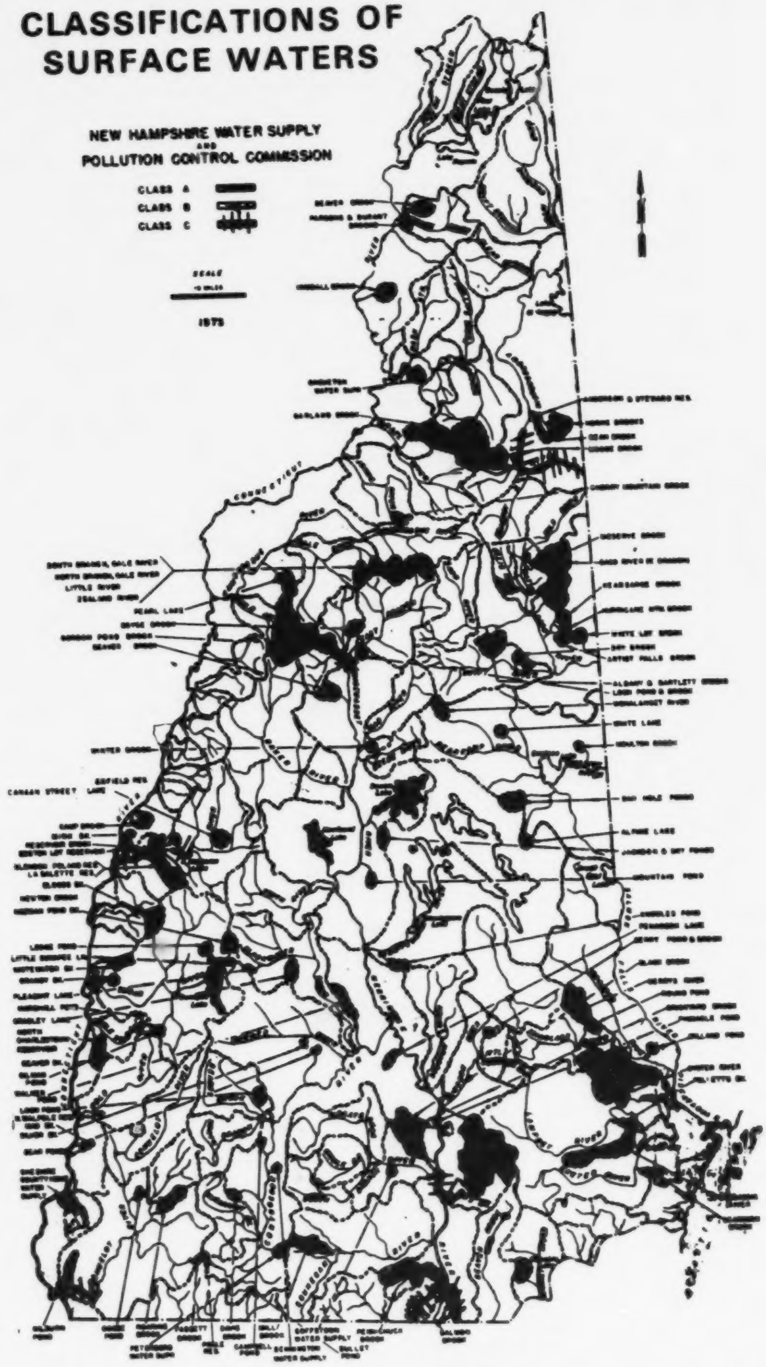
NEW HAMPSHIRE WATER SUPPLY
AND
POLLUTION CONTROL COMMISSION
CLASS A
CLASS B
CLASS C
SCALE
1975
CONNECTICUT
PEARL LAKE
CANAAN STREET LAKE
ENFIELD RES.
WHITE LAKE
FASSETT BROOK
PETERBORO WATER SUPPLY
GOFFSTOWN WATER SUPPLY
PENNICHUCK BROOK
RIVER

TABLE 2

RECOMMENDED USE CLASSIFICATIONS[1] AND WATER QUALITY STANDARDS AS OF JANUARY 1, 1970

**(Based on Chapter 149 revised statutes annotated[2] New Hampshire
Water Supply and Pollution Control Commission)**

Parameter	Class A	Class B	Class C	Class D
	Potentially acceptable for public water supply after disinfection. No discharge of sewage or other wastes. (Quality uniformly excellent).	Acceptable for bathing and recreation, fish habitat and public water supply after adequate treatment. No disposal of sewage or wastes unless adequately treated. (High aesthetic value).	Acceptable for recreational boating, fishing, and industrial water supply with or without treatment, depending on individual requirements. (Third highest quality).	Aesthetically acceptable. Suitable for certain industrial purposes, power and navigation.
Dissolved oxygen	Not less than 75% sat.	Not less than 75% sat.	Not less than 5 PPM 4	Not less than 2 PPM
Coliform bacteria per 100 ml	Not more than 50	Not more than 240 in fresh water. Not more than 70 MPN in salt or brackish water	Not specified	Not specified
pH	Natural	6.5 – 8.0	6.0 – 8.5	Not specified
Substances potentially toxic	None	Not in toxic concentrations or combinations	Not in toxic concentrations or combinations	Not in toxic concentrations or combinations
Sludge deposits	None	Not objectionable kinds or amounts	Not objectionable kinds or amounts	Not objectionable kinds or amounts
Oil and grease	None	None	Not objectionable kinds or amounts	Not of unreasonable kind, quantity or duration
Color	Not to exceed 15 units	Not in objectionable amounts	Not in objectionable amounts	Not of unreasonable kind, quantity or duration
Turbidity	Not to exceed 5 units	Not to exceed 10 units in trout water. Not to exceed 25 units in non-trout water	Not to exceed 10 units in trout water. Not to exceed 25 units in non-trout water	Not of unreasonable kind, quantity or duration
Slick, odors and surface-floating solids	None	None	Not in objectionable kinds or amounts	Not of unreasonable kind, quantity or duration
Temperature	No artificial rise	NHF&GD, NEIWPCC, or NTAC-DI – whichever provides most effective control[3]	NHF&GD, NEIWPCC or NTAC-DI – whichever provides most effective control[3]	Shall not exceed 90°F

NOTE

[1] The waters in each classification shall satisfy all provisions of all lower classifications.
[2] For complete details see Chapter 149 RSA.
[3] NHF&GD – New Hampshire Fish and Game Department
NEIWPCC – New England Interstate Water Pollution Control Commission
NTAC-DI – National Technical Advisory Committee, Department of the Interior.

TABLE 3

KEY TO SIGNIFICANCE OF LETTER DESIGNATIONS SHOWN IN FIGURE 1

	A	B	B*	C	C*	D or Worse
Total coliform bacteria count per 100 ml						
(1) Not known man-produced pollution**	≤50	≤240@	≤1,000	(N.A.)	No limit	(N.A.)
(2) Known man-produced pollution	(N.A.)	≤240@	(N.A.)	≤1,000	(N.A.)	No limit
Fecal coliform bacteria count per 100 ml						
(1) No known man-produced pollution**	≤2	(N.A.)	≤200	(N.A.)	No limit	(N.A.)
(2) Known man-produced pollution	(N.A.)	(N.A.)	(N.A.)	(N.A.)	(N.A.)	No limit
Dissolved oxygen	≥75% sat.	≥75% sat.	≥75 sat.	≥5 mg/l	≥5 mg/l	(N.A.)
"Swimmable" @@ (safe for bathing)	Yes	Yes	Yes	No	No	No
"Fishable" @@ (suitable for fishing)	Yes	Yes	Yes	Yes	Yes	#
Aesthetically acceptable (no odors, etc.)	Yes	Yes	Yes	Yes	Yes	#

*Modified class that meets all criteria except coliform bacteria.

**May include effluent from a wastewater treatment facility supplying the equivalent of secondary treatment.

NOTE: (N.A.) Criteria do not apply; @for fresh water; @@See Par. 5.1B., Page 5-1 of text.
#Class D is aesthetically acceptable, worse then Class D if obnoxious with foam, floating solids, oil slicks, odors and the like. It is assumed that with high man-produced pollution and/or aesthetically degraded appearance, fishing is not a desirable activity. Also not "fishable" for many species of fish if dissolved oxygen levels are less than 5 mg/1 or 6 mg/1 for prolonged periods.

APPENDIX A
Summary - State of New Mexico

Complete copies of the State of New Mexico 305(b) Report can be obtained from the State agency listed below:

Water Quality Section
Environmental Improvement Agency
P.O. Box 2348
Santa Fe, NM 87501

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The following 1976 Update of the report titled *Water Quality in New Mexico,* dated May 1975, was adopted by the New Mexico Water Quality Control Commission at its June 14, 1975 meeting for submission to the Congress of the United States pursuant to Section 305(b) of the Federal Water Pollution Control Act.

Water Quality in New Mexico - 1976 Update

The basic conclusions and discussion of overall water quality in New Mexico, published in May 1975, remain valid. No dramatic changes have occured in the past year because of the long-term nature of water quality management problems and programs. Management programs have been refined and point source control efforts have resulted in water quality improvement in several specific areas. A statewide non-point source planning effort has been initiated. As part of New Mexico's continuing water quality management program, broad goals and specific five-year objectives have been defined.

Goals and Objectives, 1976 - 1981

Water quality management goals in New Mexico are:

1. To maintain or improve the quality of existing surface waters, such as mountain streams and storage reservoirs, which are still capable of supporting natural life systems, and to protect water for recreational uses, where the water can physically be used for these purposes.
2. To maintain or improve, where necessary, the quality of other surface waters for designated uses and to protect the quality of all ground water which has a natural concentration of 10,000 mg/l or less TDS for present and potential future use as domestic and agricultural water supply. (Policies affecting ground water will be re-drafted, as appropriate, if the New Mexico Water Quality Control Commission adopts language other than this proposed language in ground water effluent regulations).

In striving to meet these goals, the State has taken into account the nature and history of New Mexico's stream systems. Withdrawals and subsequent depletions from these streams often result in higher concentrations of contaminants in the remaining water supply as the consumptive use of water leaves progressively less water to carry the same load. This is especially true if the constituents in the water diverted for use are returned to the source. In general, it is the policy of the Water Quality Control Commission to consider as acceptable degradation those increase concentrations which result from the return of the weight of the constituents diverted.

In view of these State goals and policies and the goals of the Federal Water Pollution Control Act, the following strategic objectives have been established to guide water quality management efforts in New Mexico for the next five years:

1. To supplement the water quality management decision-making process that involves broad based public participation and officials of State and local units of government who conduct activities related to water quality management.
2. To pursue effective remedial actions and/or enforcement procedures as a result of violations of existing regulations or stream standards, violations of permit conditions, and nuisance conditions.
3. To develop procedures which will protect the quality of New Mexico's ground water resources and to establish a ground water quality program to demonstrate that major ground water resources are being maintained suitable for use.
4. To review and revise stream standards as appropriate, with special emphasis on protecting high-quality mountain streams and the State's storage reservoirs.
5. To develop the relationships between nutrient loads and the trophic conditions of major New Mexico reservoirs.
6. To implement the established prohibition against toxic substances being present in receiving waters in concentrations which, directly or through uptake in the aquatic food chain and/or storage in animal tissues, can be magnified to levels which are toxic to man or other organisms.
7. To obtain authority for the State to operate the National Pollutant Discharge Elimination System permit program by July, 1977.
8. Within the limits of available resources, to inventory and analyse the effects of various nonpoint sources on water quality and to develop a plan of implementation in coordination with all levels of government.

Progress Achieved, May, 1975 - May, 1976

Water Quality

- **Stream Quality**

The bacteriological quality of the San Juan River has improved significantly as a result of effective disinfection of Farmington's municipal wastewater. Despite minor increases in fecal coliform levels in the San Juan River below Farmington as a result of seasonal and non-point source influences, the bacteriological quality of this segment remained well within the level established by the stream standard throughout the past year. The highest fecal coliform counts were recorded at Fruitland, but the log means of 31 samples taken between January, 1975 and January, 1976 is only 245 colonies per 100 ml. Monitoring stations above Kirtland and at Shiprock recorded similarly low levels.

On the Rio Grande, monthly samples of fecal coliform levels are alightly less than 1974 levels at the Otowi Bridge sampling station. However, the groups of sampling stations at Isleta and San Marcial show mixed results at both locations. The City of Socorro is now chlorinating its wastewater effluent. The infrequent sampling of bacterological quality of the Rio Grande is not adequate to document actual trends in the river.

- **Reservoir Quality**

Continued reservoir quality surveys, in which algal assay and other nutrient analysis methods are utilized, are documenting that different water quality management programs are required for the various major New Mexico reservoirs. Initial findings indicate that nuisance algal blooms in some reservoirs can possibly be controlled by limiting phosphorus reaching the reservoir from major point sources. Data collected at Cochiti Reservoir, which reached permanent pool status in late 1975, indicate that this reservoir is phosphorus limited. In Elephant Butte Reservoir, however, data suggest that algal growth is nitrogen limited and that phosphorus removal from the major point source above Elephant Butte Reservoir (i.e., the Albuquerque wastewater treatment plant– would not be cost-effective. In other New Mexico reservoirs and lakes the effectiveness of limiting phosphorus or nitrogen loadings is still being evaluated.

Standards and Regulations Development

- **Stream Standards**

In cooperation with the U.S. Forest Service, the Environmental Improvement Agency has gathered water quality data for numerous high mountain streams throughout the State. The existing New Mexico Water Quality Standards will be subject to public review in October and November of 1976 and the Environmental Improvement Agency will propose that additional standards be adopted for many mountain streams. Basically, numerical stream standards for total residual chlorine, ammonia and nitrate nitrogen will be proposed. Such standards will adequately protect existing water quality in high mountain streams.

- **Ground Water Effluent Regulations**

Regulations governing discharges to ground water have been drafted and the New Mexico Water Quality Control Commission will hold a public hearing regarding these proposed regulations in June, 1976. The regulations set ground water standards, with the basic intent of protecting ground water for domestic and agricultural use by controlling discharge of specific contaminants to the subsurface. Typical sources to be controlled under these regulations are animal confinement or domestic wastewater disposal lagoons, injection wells, tailings ponds and land application of wastewaters. Included in the regulation requirements, as appropriate, are the submission and approval of discharge plans, bonding of dischargers, lining of lagoons and monitoring of ground water quality. Adoption of these, or similar, ground water effluent regulations would provide a necessary and basic management tool to control present and potential ground water contamination.

Compliance Monitoring and Special Studies

- **Compliance Monitoring**

The Environmental Improvement Agency has developed the capability to conduct compliance monitoring inspections at NPDES permitted facilities. Compliance monitoring inspections are required to document the municipal and five industrial permitted facilities. Non-compliance with existing effluent limitations has been documented at seven facilities. The issuance of administrative orders requiring corrective action by the permit holder is the responsibility of the United States Environmental Protection Agency (EPA).

- **Grants Mineral Belt Study**

The Environmental Improvement Agency and the EPA completed a regional ground and surface water sampling survey in the Grants Mineral Belt. The survey was designed to assess the impacts of waste discharges from uranium mining and milling activities on surface and ground water quality in the Grants Mineral Belt. Samples were collected during February, 1975, and a selective resampling was conducted in August, 1975. Significant ground water contamination was not observed, with the exception of an area south and southwest of the United Nuclear-Homestake Partners mill. Surface flow into two streams was composed entirely of discharges containing water contaminants from four mines and two ion-exchange plants. One company is now operating barium chloride treatment plants for radium removal at the

Ambrosia Lake area and is constructing other treatment facilities. The survey results are being used at State and Federal levels to provide the basis for an examination of: Regulations affecting the uranium mining and milling industry; inadequacies in ground water sampling networks; and milling processes which contribute to potential water contamination problems.

- **Non-point Source Planning**

A statewide non-point source planning effort has been initiated, institutional arrangements have been defined and a two-year planning program will commence July 1, 1976. The level of detail and timing of water quality plan preparation pursuant to Section 208 of the Federal Water Pollution Control Act depends upon the water quality problems of the area and the water quality decisions made. Specific planning areas include the Albuquerque metropolitan area and Navajo Reservation lands. Planning will be concentrated on major water quality objectives (see above).

- **Middle Rio Grande Nutrient Analysis**

A two-year survey of the Middle Rio Grande between Albuquerque and San Marcial has demonstrated that inorganic nitrogen and orthophosphate are elevated significantly below Albuquerque by the city's wastewater discharge. However, through transformations and losses in the 130-mile reach, the inorganic nitrogen is reduced to low concentrations at the downstream monitoring station at San Marcial. Because of the critical nature of nitrogen loading on Elephant Butte Reservoir (see *"Reservoir Quality"*), nutrient loadings to the reservoir will receive additional field and laboratory study. A preliminary nitrogen mass balance has been developed. Initial findings suggest that crop exports are not major nitrogen sinks and that non-point sources are not the major contributors to nitrogen loads, although the impact of urban runoff is not known at this time.

APPENDIX A
Summary - State of New York

Complete copies of the State of New York 305(b) Report can be obtained from the State agency listed below:

Division of Pure Waters
New York State Department of
Environmental Conservation
Albany, NY 12301

Annual Statewide Assessment - 1976

Major Accomplishments Since the 1975 Report

The identified surface waste source discharge inventory has increased from 2,202 reported last year to the current level of 3,077 this year. Similarly, the major dischargers category has increased from a previous level of 457 to the current level of 833. Permits issued to the major dischargers have increased from 57 percent last year to 86 percent this year. 90 percent of these major dischargers are expected to comply with the 1977 goals of the Act as indicated by the compliance timetables in the issued permits.

As of March 31, 1976, construction grants funds for municipal treatment works totaling $119 million had been approved. By June 30, 1976, this figure is expected to increase to $495 million. Last year, 85 percent of the "approved" category of New York State's total municipal construction grants program were for projects in the five priority basins: Atlantic Ocean. Long Island Sound; Lower Hudson River; Lake Erie/Niagara River; Seneca-Oneida-Oswego River and Mohawk River. This year the relative proportion will "drop" to 83 percent even though $240 million worth of new projects will be approved. This reflects the increased emphasis given to solving water quality problems in the other lower priority basins. Results of these expenditures will not be reflected in water quality improvements for some years hence, depending on the length of the construction schedule.

Data processing capabilities have been expanded over the past year and the pollutant discharge elimination system permit master file has become operational for tracking progress of dischargers in meeting requirements for effluent standards and compliance dates. The-self monitoring aspects of this system are similarly nearing operational status and will provide for automated mailing and updating of the discharge monitoring reports (DMRs) directly into the computerized system. Retrieval capabilities have already been exercised for tracking DMR submittals and in dealing with toxic substance dischargers which will be further used in selecting candidates for compliance monitoring sampling. Table 1 shows the status of selected New York State water pollution control program elements.

Changes in Water Quality Since the 1975 Report

There has been no substantive change in quality of the State's water bodies during the past year. Although there are isolated instances where a few new plants have become operational, the major problem areas previously identified are still awaiting completion of complex treatment systems (i.e., New York City, Niagara Frontier, and Central New York) before water quality responses can be expected. On a similar note, basin water quality assessments do continue to identify water quality problems directly associated with contamination by discharges from combined sewers and urban runoff. This category of pollution is the single most important obstacle to achieving water quality objectives. Ironically, the United States Environmental Protection Agency (EPA) is continually attempting to restrict project eligibility for correction of combined sewer discharges under PL 92-500. Consequently, multitudinous problems and delays are created in attempting to pursue a rational State program for water pollution control at the six major urban/industrial areas where combined sewer discharges are manifested. As a result, as indicated in various of the basin water quality assessments, bathing beaches and shellfishing waters periodically affected by discharges from combined sewers will continue to experience frustrating periods of closure.

Figure 1 shows trends in water quality of the various major New York State rivers. These trends utilize the water quality index (WQI) as developed by the National Sanitation Foundation at Ann Arbor, Michigan. Ten years of monitoring records are represented from which nine key parameters indicative of the conventional pollution categories are extracted for WQI computations.

The eight major rivers shown are only a few examples of the trend data available. In the Niagara River, the quality of Lake Erie outflow measurably increases at the Lake Ontario inflow, in spite of the significant discharges along the Niagara Frontier, a tribute to the tremendous self-purifying capability of Niagara Falls and the pollution abatement effort. Hudson River water quality reflects the abuses of pollutant discharges which lower its "good to excellent" rating above Corinth, to a rating of "bad to medium" below the Capital District, some 80 miles downriver. The Oswego River at Oswego, New York, reflects the combination of effects of canalization, hydroelectric regulation and drainage from the highly developed central New York area with a steady "medium" rating.

On the Mohawk River, the monitoring station below Fonda, New York, dramatically illustrates the beneficial impacts of the tertiary treatment plant serving the Johnstown-Gloversville area andthe Oneida County Sewer District secondary plant completed in early 1970's. Similarly, completion of secondary treatment facilities in the Binghamton and Elmira areas are reflected in improved Susquehanna and Chemung River quality respectively. Abatement efforts by Eastman Kodak on the lower Genesee River have had limited effect on water quality improvement pending correction of the City of Rochester's combined sewer overflow problem.

Synopsis of the State Biological Monitoring Program

In 1972, a biological monitoring component to the State's Primary Water Quality Monitoring Network was

TABLE 1

SUMMARY OF SELECTED NEW YORK STATE WATER POLLUTION CONTROL PROGRAM ELEMENTS

				Principle discharges				Construction grants status ($\$x10^6$)			WQ surveillance status	
Basin	Area (sq. mi.)	Avg. annual flow-(cfs)	Total discharges	Total	Permitted	MGD	% Meeting 1977 goals	Approved	FY 76-project priority list	'74 Needs*	Physical/ chemical	Biological
L. Erie-Niagara River	2,300	2,563	258	102	90	728	71	559	128	900	15	(26)**
Allegheny River	1,921	3,242	95	35	31	43.8	87	42	10	62	6	9
L. Ontario Minor Trib.	2,457	4,344	184	82	67	219	84	409	287	437	3	12
Genesee River	2,373	2,664	111	30	25	74	88	100	14	162	10	8
Chemung River	1,740	1,760	72	20	15	46	93	20	18	192	6	10
Susquehanna River	4,517	7,050	117	40	38	84	87	67	18	264	8	10
Seneca-Oneida-Oswego	5,067	6,363	277	98	87	270	83	282	107	520	12	32
Black River	1,916	3,900	52	16	15	50.8	93	20	2	43	2	(20)
St. Lawrence River	5,539	8,808	112	26	25	70	100	26	14	95	5	((20))**
Lake Champlain	2,900	3,686	52	17	12	69.8	92	35	5	110	4	((10))**
Upper Hudson River	4,070	6,557	81	28	24	89.3	92	55	69	89	11	12
Mohawk River	3,456	5,707	170	42	36	166.3	94	131	34	454	16	40
Lower Hudson River	5,276	7,994	633	108	101	595	93	1,313	177	1,949	14	20
Delaware River	2,362	4,497	286	18	12	23.5	100	7	29	104	5	16
Newark River	265	440	40	4	2	4.1	100	9	–	124	0	0
Housatonic River	168	262	14	2	0	3.2	N/A	–	–	10	0	0
Atlantic-Long Island Sound	1,406	1,000	523	165	137	1,839	97	1,654	642	10,547	5	0
Total	47,733	70,837	3,077	833	717	13,648.1	90	4,729	1,554	16,063	122	251

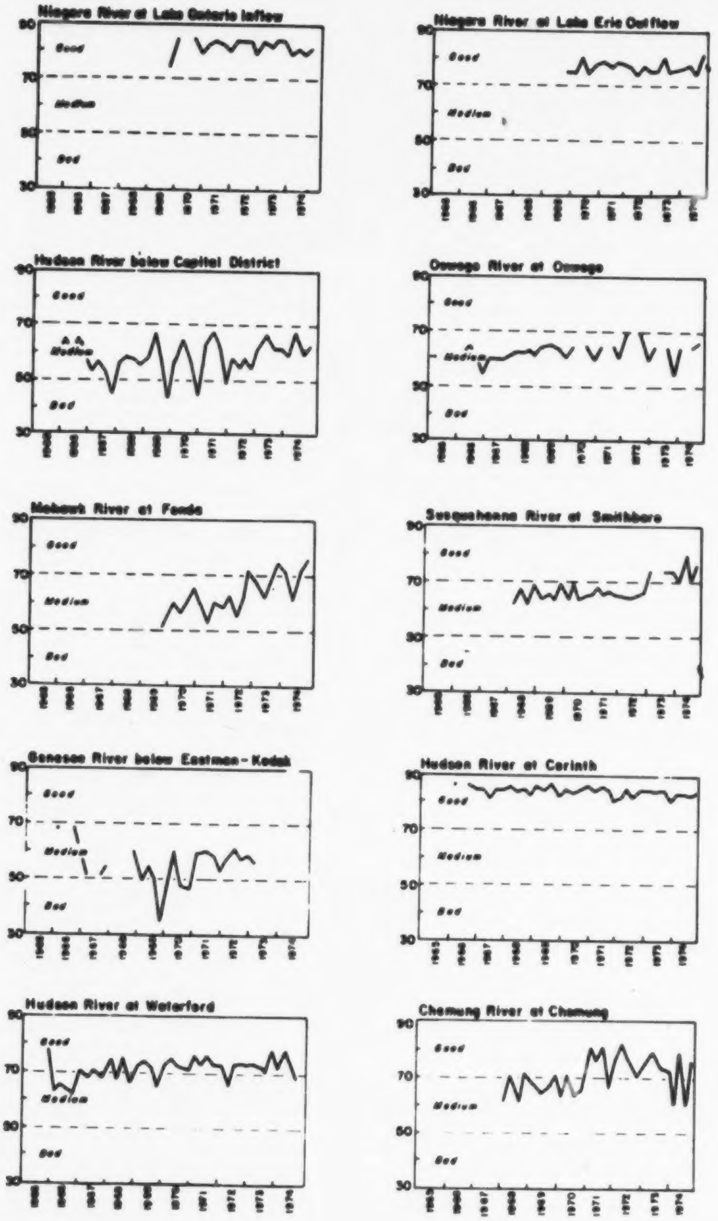
*Costs in June 1973 dollars, exclusive of Category VI – Treatment and/or Control of Stormwaters.

**Figures in ( ) to be established during FY 76-77, figures in (( )) to be established during FY 77-78.

***As of March 31, 1976. List will be updated in final submittal.

FIGURE 1

WATER QUALITY INDEX TRENDS



inaugurated. The approach utilized artificial substrates for obtaining quantitative samples of macroinvertebrates indigenous to the subject waterbodies. Seasonal harvesting of the samplers followed by picking, sorting and taxonomic identifications have been successful in analyzing biological community structures, species diversity and similarity coefficients and equitability. This information provides the capability to assess the biological health of the State's major river systems and a valuable insight to the adequacy of existing water quality standards and related pollution abatement efforts in protecting aquatic resources. Based on this information, together with conventional physical/chemical data, standards revision, where necessary, can be made on a rational basis tailored to the waterbody under consideration.

The program was set up to cover the State's major river systems on a five-year cyclic basis. That is, a river, once surveyed, will not normally be resampled until five years later. Indicator organisms, identified in the first round, will serve as an overall measure of changes in biological health resulting from pollution abatement (or slippage) in the intervening years. More recently, macroinvertebrate samples have shown a significant potential for reflecting annual bio-accumulation of substances such as PCBs. Integration with longer term accumulations reflected by fish flesh sampling, yields a powerful tool in assessing chronic or acute levels of pollutant contamination.

To date, 175 biological monitoring stations have been established in ten of the State's 17 major basins. Forty-six (46) more stations will be established in FY 76-77 and the remaining 30 stations of a statewide total of 251 will be done in FY 77-78.

Toxic Substances Monitoring Program

The Department's Division of Fish & Wildlife initiated analyses of fish flesh for DDT in the early 1960's because of data suggesting adverse affects of chlorinated hydrocarbons on reproductive capabilities of fish and wildlife resources. Results of this investigation led to State restrictions on use of DDT in 1971. However, research indicated that DDT analyses could be biased through contamination with similar compounds, such as polychlorinated biphenyls (PCBs). Therefore, from 1970 to August, 1975, PCBs were evaluated in all fish flesh analyses as a peripheral activity to DDT sampling.

Disclosures in mid-1975 of high PCB levels in fish by EPA sampling precipitated a shift in the Department's monitoring scheme. An intensified sampling program of fish populations (predator, forage, and rough species), water columns, and bed sediments was launched in August, 1975, at stations selected in most large industrialized waterways throughout the State and in several Adirondack streams. The objectives of this effort were to: (a) ascertain general ambient conditions; (b) assess the PCB problem statewide; and (c) trackdown sources causing identified "hot spots", if any.

The report presents a summary of the stations sampled in the various waterways, and the results of PCB analyses in composite fish flesh samples (weighted mean), water column, and bottom sediments. PCB concentrations exceeding the U.S. Food and Drug Administration's "actionable" level were noted in the Hudson River, Lake Ontario, Mohawk River, Genesee River, Onondaga Lake and Lake George. To date, advisories on consumption of fish were issued only for Lake Ontario, the Hudson River, Onondaga Lake (mercury) and lake trout in Lake George (mercury).

Coincident with the concern for PCBs, DDT, and mercury, was the need for a better handle on toxic substances in general. Because water column and bottom sediment sampling are subject to too many vagaries, it was decided to further utilize fish populations as the media for detection of a broader scope of toxic substances: Metals - arsenic, cadmium, chromium, copper, lead, mercury and zinc; and pesticides - aldrin, benzene hexachloride (BHC), chlordane, DDT's, endrin-dieldrin, heptachlor, heptachlor epoxide, mirex, PCBs, picloram, and other organic compounds as necessary.

Fish of various species will be collected over a three-year cycle from about 140 statewide sampling locations and utilized for analysis. If toxicants are present in the aquatic environment, they should be found in the tissue of fish, especially if the compounds are persistent and biomagnify. Analysis of these individuals will therefore supply data on the current environmental health of each waterway.

Part II of this program addresses data interpretation and bioassay aspects. Funding for Part I is provided by regular State purposes funds while Part II is proposed for funding under the supplemental Section 106 funds.

Water Quality Accidents Summary

During the past three calendar years there have been more than 2,000 water quality accidents reported which accounted for more than 4.5 million gallons of petroleum products and other hazardous substances being spilled into the environment. To date in 1976, there have been 410 water quality accidents reported involving over 3,511,500 million gallons of oil and other hazardous substances.

Summary

Year	Number of spills	Volume oil (gallons)
1973	585	2,164,000
1974	590	1,868,000
1975	870	508,000
1976	410	3,511,500

General Department objectives include the following:

- Ensure immediate investigation of all reported water quality accidents (WQAs) for evaluation of environmental hazards;
- Ensure immediate response to all reported WQAs to minimize environmental damage;
- Ensure that the primary responsibilities for spill control and cleanup is placed with the discharger;
- Obtain information on the character and status of WQAs for evaluation of response efforts and to inform the general public; and
- Obtain information on causes and effects of WQAs for appropriate legal action, for remedial actions to limit adverse environmental impacts and for development of an approach for the prevention of future spillages of oil and hazardous substances.

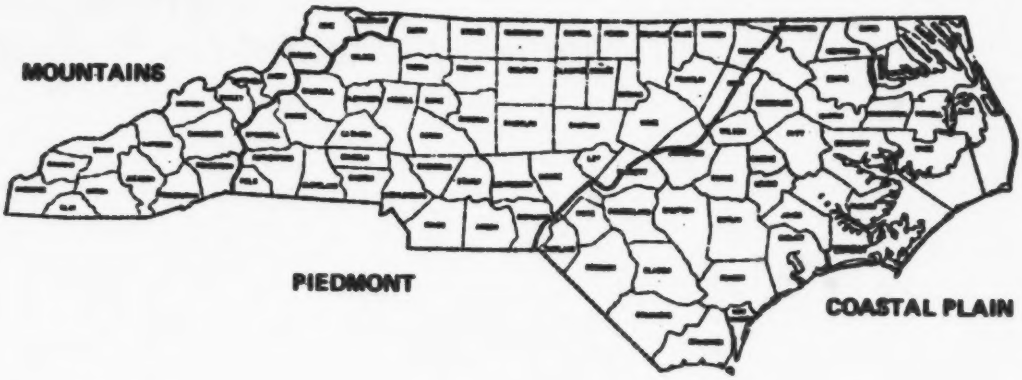
Toward these ends, the Department maintains a policy and procedures item on Water Quality Accidents (Chapter 1810 of DEC Policy and Procedures Manual). A 24-hour "hot line" (Area Code 518–457-7362) is maintained as is an updated Notification Roster listing all Federal, State, county and local officials having jurisdiction in any part of the State.

APPENDIX A

Summary - State of North Carolina

Complete copies of the State of North Carolina 305(b) Report can be obtained from the State agency listed below:

Division of Environmental Management
Department 1, of Natural and
Economic Resources
Raleigh, NC 27611



Introduction

The State of North Carolina encompasses an area of 52,712 square miles of which 49,067 is land and 3,645 is inland waters. According to the 1970 census, the population of the State is estimated at 5,082,000. There are an estimated 40,000 miles of streams and 1,382 identified surface water dischargers within the State.

North Carolina is divided into three distinct regions, each of which has its own unique water resource benefits and problems. The Mountain region is characterized by its high mountain peaks (223 mountains have elevations greater than 5,000 feet), dense woodlands and relatively sparse population. The water quality in this region is good with the many spring-fed mountain streams providing high quality waters which support many excellent trout fisheries. While the cold turbulent waters of this region are capable of assimilating much larger quantities of oxygen-consuming materials than the Piedmont and Coastal waters, the protection of sensitive fish species such as mountain trout requires the prevention of even slight degradation of water quality.

The Piedmont region is characterized by much lower elevations and gently rolling hills. Since this region is the most populated and industrialized area of the State, a tremendous demand is placed on water resources. Not only does the Piedment region contribute the heaviest waste load to the waters, but it also has the greatest demand for clean water for public and industrial consumption and for recreation. As would be expected, the majority of the state's water quality problems occur in this region.

The Coastal Plain region is characterized by generally flat terrain spanning from the higher elevations near the Piedmont to the low lying swamplands in the east to the sandy beaches of the coast. The water quality in this region is generally good except in areas of dense population. The waters in this region have higher temperatures and are slow moving and sluggish, thus they can assimilate much less oxygen demanding substances. Drainage from the swamplands often cause naturally occurring low oxygen levels, low pH, and high color and turbidity in streams in the area. Since the coastal waters receive the residues from the interior parts of the State, there is a potential for water quality problems, especially deposits of harmful substances and nutrient over-enrichment, in the bays and sounds inside the Outer Banks. The protection of fish and shellfish in the coastal waters is an important consideration in this region since the harvesting of shellfish and commercial and sport fishing is a major commercial resource of the area.

Section 1 - Program Status

Discharge Compliance

This is an inventory of major municipal and private facilities within the State. A total is shown for municipal facilities required to maintain secondary treatment and for those facilities limited by water quality standards. Totals for privately owned facilities are for facilities required to provide best practicable treatment (or secondary treatment) and those limited by water quality standards. For each category the number of facilities in compliance with required treatment levels at the beginning and end of the reporting period is shown to indicate the increment of achievement.

Type facility	Water quality-limited	Number in compliance at beginning of period	Number in compliance at end of period	Secondary treatment / BPCT	Number in compliance at beginning of period	Number in compliance at end of period
Municipal	219	40	46	153	64	68
Private	336	127	151	486	302	331
State/Federal/County	66	18	18	122	60	62

Program Achievements

The following is an inventory of major program achievements during calendar year 1975:

- **Planning Element**
  - a. 303(e) Phase I Basin Plan (as of December 31, 1975)
    - i. Completed: All (14)
    - ii. Public hearing held: 5
    - iii. Adopted by N.C. Environmental Management Commission: 5
  - b. 208 Planning Coordination
    - i. Preliminary work plans reviewed: 5
    - ii. Final work plans reviewed and certified: 1
- **Permits Program**
  - a. NPDES permits issued: 319
  - b. State permits issued for construction and operation of waste treatment facilities: 408
- **Municipal Facilities Management**
  - a. 201 Facility Planning Area Delineations
    - i. Tentative: 41
    - ii. Final: 56
  - b. Step I Grant Applications approved by EPA: 112
    - i. Total of eligible project costs: $5,543,231
    - ii. Total of Federal grants (75%): $4,293,099
    - iii. Total of State grants (12.5%): $715,515
  - c. 201 Facilities Plans
    - i. Completed and submitted to State for review: 34
    - ii. Certified by State: 13
    - iii. Approved by EPA: 6
  - d. Step II Grant Applications Approved by EPA: 2
    - i. Total of eligible project costs: $1,316,645
    - ii. Total of Federal grants (75%): $987,484
    - iii. Total of State grants (12.5%): $164,580
  - e. Construction drawings and specifications reviewed: 6
  - f. Step III Grant Applications Approved by EPA: 10
    - i. Total of eligible project costs: $74,741,356
    - ii. Total of Federal grants (75%): $56,056,107
    - iii. Total of State grants (12.5%): $9,342,268
- **Monitoring Element**
  - a. Intensive Water Quality Surveys Completed: 27
  - b. Primary Sampling Network
    - i. Number of sampling visits: 4,560
    - ii. Field analyses made: 19,779
    - iii. Laboratory analyses made: 22,999

c. Lake Studies
    i. Number of lakes sampled: 28
    ii. Number of station visits: 1,353

d. Biological Sampling
    i. Stream stations: 136; number sampled; 94
    ii. Estuary stations: 21; number sampled; 9
    iii. Lake studies: 29; number sampled; 15
    iiii. Special studies: 5

Program Objectives

The following is an inventory of major program objectives for calendar year 1976:

- **Planning Element**

a. 303(e) Phase I Basin Plans (14 total)*
    i. Public hearing to be held: 9
    ii. To be adopted by N.C. Environmental Management Commission: 9

b. 208 Planning Coordination
    i. Preliminary work plans projected to be reviewed: 12
    ii. Final work plans projected to be reviewed and certified: 18

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*All Section 303(e) Basin Plans will be revised during calendar year 1976.

- **Permits Program**

a. NPDES Permits projected to be issued: 574

b. State and Federal permit implementation schedule milestone dates
    i. Preliminary plans to be completed: 2
    ii. Final plans to be completed: 34
    iii. Facilities plans to be completed: 7
    iv. Construction to be initiated: 77
    v. Construction to be completed: 180
    vi. Number of facilities required to attain operational level to meet final effluent limits: 387
    vii. Facilities required to cease discharge: 6

- **Municipal Facilities Management**

a. Step I Grant Applications projected to be approved: 55
    i. Total of projected eligible project costs: $1,823,699
    ii. Total of projected Federal grants (75%): $1,367,776
    iii. Total of projected State grants (12.5%): $224,961

b. 201 Facilities Plans
    i. Projected to be certified by State: 43
    ii. Projected to be approved by EPA: 32

c. Step II Grant applications projected to be approved: 29

d. Step III Grant applications projected to be approved: 8

- **Monitoring Element**

a. Intensive Water Quality Surveys Scheduled: 25

b. Primary Sampling Network
    i. Number of station visits scheduled: 4,440
    ii. Number of field analyses projected: 26,600
    iii. Number of laboratory analyses projected: 30,895

c. Lake Studies
    i. Number of lakes projected to be sampled: 32
    ii. Number of station visits projected: 2,663

d. Biological Sampling
    i. Stream stations: 150; number of sampling visits projected; 226
    ii. Estuary stations: 5; number of sampling visits projected; 15
    iii. Lake studies: 19; number projected to be sampled; 19

Pollution Control Costs

- **Municipal and Industrial Treatment Costs**

	Total cost (Average)	
	Capital	Operating (annual)
Industrial costs – to meet 1983 goals	$353,477,500	$72,678,980
Municipal costs - per 1974 needs survey	$2,158,705,810	$18,000,018

Industrial costs are based on Effluent Guidelines Economic Assessment Information provided by EPA. Costs estimates were made for most of the major industry in North Carolina. However, several hundred of the smaller industries and the power generating plants are not included in the above cost estimates. Municipal costs have been updated to reflect January 1976 dollars via the 1976 Needs "Printout of Record" which is based on the 1974 Survey of Needs for Municipal Wastewater Treatment Facilities. Annual municipal operation and maintenance costs were estimated from existing facilities and are 1975 cost estimates.

- **Non-point Source Control Costs**

Cost estimates for the control of non-point source pollution are unavailable on a statewide basis. As designated and/or non-designated Section 208 studies provide more detailed information relative to the magnitude, sources, and controls of non-point source pollution, control cost evaluations will be made. Such costs will be reported in future 305(b) Reports.

Section 2 - Current Water Quality, Trends, Objectives

Monitoring

- **Data Summary — Primary Monitoring Network**

The Primary Monitoring Network consists of 369 fixed stations on the mainstem or major flowing streams of the State and on major tributaries to those streams. This network is maintained to collect data on the present status of water quality and evaluate historical trends in water quality.

The water quality data for each primary station have been evaluated by parameter groups. The following statewide evaluation of the current water quality, with respect to each parameter group, is based on the station evaluations, special studies, and undocumented general knowledge (Table 1).

- **Harmful Substances**

The parameters evaluated in this group include cadmium, total chromium, cobalt, copper, iron, lead, manganese, zinc, arsenic, pesticides, and phenols. Iron, manganese, and mercury were found to be at significantly high levels in several of the river basins in the State. Iron and manganese, while they do pose problems in public water supplies, do not appear to be controllable to a significant degree since they are believed to be naturally occurring due to the iron and manganese bearing clays common to the Piedmont region of the State. The source of mercury in the waters has not yet been definitely established. A special study conducted in the Haw and Deep River drainage areas revealed higher than background levels of mercury in the bottom muds of streams receiving wastes from municipalities where mercury discharges had been higher than normal prior to the 1971 drive to eliminate mercury as a source of pollution. While this study does indicate that municipal discharges contributed to high mercury levels in bottom muds, the extent to which these discharges are now contributing to the mercury problem and the contribution of non-point sources is unknown. Levels determined from bottom muds not having received mercury pollution were found to be at concentrations of 10 ug/gram or less. This may be a background level for this part of North Carolina. Further studies of the problem are planned for FY 1977.

- **Physical Modification**

The parameters evaluated in this group include temperature, turbidity, suspended and total solids, color, and Secchi disc. While physical modification does not appear to be as serious a problem as other parameter groups, some degradation was noted with respect to turbidity and suspended solids. Many of the streams in the Piedmont area of the State are often highly turbial because of soil and clay loss and resuspension during rainfall events. The Sediment Control Act of 1974, when fully implemented, should significantly reduce sedimentation from construction operations, a principal source of suspended and settleable solids.

- **Eutrophication Potential**

The parameters evaluated in this group include nitrate + nitrogen, total phosphorous, and orthophosphate. An evaluation of the existing water quality with respect to eutrophication potential was not made for each primary station. While there have been only a few occurrences of severe algae blooms in the State, the potential for such occurrences does exist. Of particular concern are existing and planned reservoirs receiving large quantities of treated domestic and industrial wastes, as well as undertermined quantities of nutrients from non-point sources. Evaluation of the eutrophication potential is greatly hampered by the lack of sound information on levels of nutrients in slow-moving streams and short retention time reservoirs which would, when present, cause over-enrichment problems. The control of the discharge of nutrients is further hampered by the lack of quantitative standards for the major nutrients (nitrogen and phosphorous). A study presently being conducted on the Chowan River should yield valuable information in evaluating over-enrichment problems in the estuary systems.

- **Salinity, Acidity, and Alkalinity**

The parameters evaluated in this group include pH, alkalinity, specific conductance, salinity, and acidity. With the exception of a few isolated problem areas receiving industrial waste with an abnormal pH or high salinity, the parameters in this group do not appear to pose significant water quality problems in this State. Most of the industrial waste problems are expected to be corrected by July 1977.

TABLE 1

WATER QUALITY CONDITIONS AND TRENDS

Water Quality

Parameter group	Poor	%	Fair	%	Good	%	Excellent	%
Harmful substances	2	1	57	19	189	64	48	16
Physical modification	–	0	3	1	107	31	240	68
Salinity, acidity	6	2	35	10	248	71	61	17
Oxygen depletion	9	3	29	8	150	43	162	46
Health hazard	30	9	49	14	161	47	101	30
Station summaries	4	1	37	11	294	84	15	4

Trend

Parameter group	Improving	%	Stable	%	Degrading	%
Harmful substances	35	11	260	88	1	1
Physical modification	9	3	341	97	–	0
Eutrophication potential	1	1	314	98	2	1
Salinity, acidity	8	2	334	96	8	2
Oxygen depletion	37	11	310	88	3	1
Health hazard	25	7	313	92	3	1
Station summaries	10	3	340	97	–	0

- **Oxygen Depletion**

The parameters evaluated in this group include dissolved oxygen, total Kjeldahl, ammonia, BOD, and COD. Dissolved oxygen levels in the major rivers in the State, with the exception of a relatively short segment of Tar River, are within limits recommended for the protection and propagation of fish and wildlife. However, water quality problems with respect to dissolved oxygen do exist in several of the smaller streams, particularly in the densely populated areas of the Piedmont. Of particular concern are the streams in flat terrain with a critical low flow of 0.0 cfs. These streams are unable to assimilate the small amounts of waste they presently receive unless treatment in excess of BAT is provided. Since many of the dischargers of this type are small facilities (less than 20,000 gallons per day), the economic burden of this degree of treatment is felt to be unrealistic. While dissolved oxygen concentrations in the State have shown some improvement in the past year, it is anticipated that the achievement of 1977 effluent limitations in 1976 and early 1977 will produce significant improvement in dissolved oxygen concentrations throughout the State.

- **Health Hazard**

The parameters evaluated in this group include fecal coliform and total coliform. Elevated bacteriological levels is the most noticeable and widespread water quality problem in the State. While significant improvement has been noted in certain drainage areas due to increased number of facilities providing more adequate disinfection, severe problems still exist in densely populated area. The non-point source contribution to the coliform contamination of the waters is considered to be substantial. Unless effective control measures of the non-point source contribution are developed, achievement of fecal coliform standards for protection of bathing waters could be a major pitfall in achieving the 1983 water quality goals. Total coliform levels in shellfish waters subject to drainage from developed areas have shown a marked increase in recent years (based on shellfish sanitation data). It is anticipated that some reversal of this trend will result from the completion and implementation of Section 208 studies for these areas. Bacteriological studies of the major recreational lakes in the State indicate that these waters are relatively free of fecal coliform contaminants.

Table 1 is a summary of water quality conditions and trends found at all primary stations where sufficient data existed for evaluation. Since the primary sampling network was established to provide a representative sampling of water quality in the State, this table should reflect the general quality of the waters of North Carolina. The existing water quality is described as follows:

Poor:	Pollutants were found to be in excess of recommended levels most of the time.
Fair:	Pollutants were found to be in excess of recommended levels some of the time.
Good:	Pollutants were seldom found to be in excess of recommended levels, but slight degradation was noted.
Excellent:	Pollutants were never found in excess of recommended levels, and no degradation was noted.

Water quality trends are described as improving, stable, or degrading. These trends were evaluated on the basis of existing data and although flow and temperature were considered in determining the trend, more or less favorable flow and temperature conditions may reverse the trend in future years. As the data base is broadened to reflect variations resulting from climatic conditions, trend characteristics will be more responsive to changes in point and nonpoint controls.

- **Biological Network**

Biological monitoring as an integrated part of other monitoring programs consists of collecting and identifying bottom-dwelling animals, attached algae, aquatic plants, and fish at selected stations. The stations selected are primarily stream stations; however, some sampling is done involving reservoirs and estuaries. Biological monitoring is a means of detecting subtle changes over long periods of time, abrupt changes that need investigation, or evidence of a need for more stringent regulatory controls. The North Carolina Biological Monitoring Network was established in 1975.

Since this program is still in its infant stage, the statewide coverage is not sufficient to evaluate biologically based water quality on a statewide or basin basis. In addition, no historical data are available to detect biologically based water quality improvements or long-term trends. The State summary of stream stations is included for general information but should not be considered as a representative statewide sample.

State Summary

Stream Stations — *96 stations sampled*

Clean: 29
Slightly degraded: 34
Degraded: 33

Lake Stations — *14 lakes sampled*

Lake Name	*Status*
Lake James	Mesotrophic
Lake Rhodhiss	Early eutrophic
Lake Hickory	Early eutrophic
Lookout Shoals Lake	Early eutrophic
Hiwassee Lake	Early mesotrophic
Fontana Lake	Aging oligotrophic
Santeetlah Lake	Aging oligotrophic
Lake Wheeler	Eutrophic
John H. Kerr	Mesotrophic
Lake Gaston	Mesotrophic
Roanoke Rapids Lake	Mesotrophic
Rocky Mount Reservoir	Mesotrophic
W. Kerr Scott	Eutrophic
High Rock Lake	Early eutrophic

- **Bacteriological Lake Studies**

The following lakes were sampled during the summer of 1974 to determine the bacteriological quality of the waters.

Lake name	Acres	Attendance (people/year)
Lake Lure	1,500	50,000
White Lake	1,068	250,000
Singletary Lake	572	5,000
Black Lake	1,418	7,000
Whispering Pines Lakes (six lakes)	387	Not available
Lake James	6,510	239,000
Lake Rhodhiss	3,515	263,000
Lake Hickory	4,110	420,000
Lookout Shoals Lake	1,270	126,000
Lake Norman	32,510	2,232,000
Mountain Island Lake	3,235	121,000
Lake Wylie	12,455	6,029,000
Hiwassee Lake	6,280	315,000
Apalachia Lake	1,123	11,000
Fontana Lake	10,670	644,000
Lake Santeetlah	2,863	10,000
John H. Kerr Reservoir	83,200	3,710,000
Lake Gaston	20,300	130,000
Roanoke Rapids Lake	4,900	179,000
W. Kerr Scott Reservoir	4,000	595,000
High Rock Lake	15,886	25,000
Badin Lake	5,973	15,000
Lake Tillery	5,260	500,000
Total	229,005	15,876,000

Fecal coliform levels in the recreational areas of these lakes were found to be within acceptable limits, indicating that the waters are satisfactory for recreation in and on the waters.

- **Intensive Surveys — Special Studies**

Intensive water quality surveys were carried out on 11 streams to provide data for the verification of water quality models. Most of the segments studied are located below existing waste treatment facilities, with the result that water quality violations were found in several cases.

Sixteen Class "D" streams in the upper Neuse drainage area were studied in December 1975, for possible reclassification. Those streams draining the heavily urban areas of Raleigh exhibited depressed DO values and fecal coliform violations. Streams in the surrounding suburban areas were generally found to be clean and free of violations. Eighty-four other

Class "D" streams are being studied, with sampling scheduled for completion by July 1, 1976.

Several special studies were initiated or continued during 1975, which address specific existing or potential water quality problems in the State. Two monitoring programs are being conducted in the First Colony Farms and Open Ground Farms areas to assess the impact of land clearing, soil preparation, crop cultivation, and cattle production on the water quality of streams surrounding these two megafarm operations in eastern North Carolina. The Chowan River and estuary system study in northeast North Carolina is a continuing project designed for the formulation and evaluation of the nutrient budget and development of predictive models for this type of river/estuary system. Mercury studies in the upper Cape Fear drainage area revealed higher than background levels of mercury in the bottom muds of streams receiving wastes from municipalities where mercury discharges had been higher than normal prior to the 1971 drive to eliminate mercury as a source of pollution. Further studies are planned to assess the magnitude and possible solutions to this problem.

- **Oil and Chemical Spills, Fish Kills**

Oil and Chemical Spills
    Number of spills reported: 151
    Number reaching watercourse: 93
    Number resulting in adverse water quality: 81
    Number of recommended assessments: 19
Fish Kills
    Number of fish kills investigated: 12
    Number of recommended assessments: 5

Non-point Source Pollution

- **Estimated Pollution Loads**

Estimated number of lbs/day of pollutants reaching surface waters of the State contributed by agricultural activities are:

	Beef	Dairy	Swine	Poultry	Fertilizer	Total
Number	719,399	139,189	1,390,821	72,955,776	–	–
BOD_5	21,582	24,446	214,184	36,478	–	298,690
TOC	71,939	32,013	216,966	51,069	–	371,988
N	5,755	4,732	12,517	14,591	7,400	44,996
PO_4	2,158	3,758	6,954	2,189	146	182

These data are based on 1973 agriculture statistics. The actual pollutant loads are believed to fluctuate greatly from year to year as crop and livestock production is adjusted to meet market demands.

Land use, by thousands of acres, has been estimated as follows (1975 figures):

Total	Urban	Water	Cropland and pasture	Forest	Other
31,190.4	1,461.7	2,565.1	8,197.7	18,355.5	610.4

Major crop production, by thousands of acres, have been estimated as follows: (1974 figures).

Corn	– 1,720	Soybeans	– 1,475
Wheat	– 325	Peanuts	– 168
Oats	– 170	Cotton	– 158
Barley	– 70	Tobacco	– 1,187
Rye	– 105	Hay	– 325
Sorghums	– 100	Potatoes	– 39.7

The woods products industry is well developed in many areas of the State, and sediment depositions occur from both harvesting and the building of logging roads. However, the degree of impact of these operations on water quality has not been assessed.

Urban runoff is known to cause significant water quality problems in several areas of the State, particularly in the densely populated areas of Raleigh Durham, Winston-Salem, Charlotte, Asheville, and other areas. This problem is being addressed in Raleigh-Durham and Asheville through Section 208 studies.

The actual impact of the above non-point source pollutant loads cannot, at the present time, be determined. However through the Phase II Water Quality Management Planning Process and/or the designated Section 208 planning process, these figures will be further refined and an evaluation of the impacts and controls will be made.

- **Adequacy of State Erosion Control Programs**

In 1973, Rules and Regulations for Erosion and Sediment Control were promulgated pursuant to G.S. 113A Article 4. This much-needed regulation has resulted in 1,500 erosion control plans to date, which demonstrate the excellent beginning being made in this area.

Section 3 - Water Quality Standards

Existing Standards

The classifications and water quality standards applicable to the streams of North Carolina are in tabular form below. This information is based upon the classifications and applicable standards effective January 1, 1976.

Class	Miles	Percent
A-I	202	0.5
A-II	4,844	12.1
A-II and B	254	0.6
B	1,235	3.1
C and SC	*31,173	78.0
SA	1,186	3.0
SB	484	1.2
D	596	1.5
Total	*39.974	100.0

*Estimated.

- **Attainment of Fishable (1977) Goal**

PERCENT WHICH WILL MEET 1977 GOAL. A total of 98.5 percent of the streams in the State are assigned classifications and water quality standards which will protect the waters for fish and wildlife propagation and secondary recreation. The exact mileage of streams which do not meet these standards is unavailable; however, the number is estimated to be approximately 5.5 percent of the total.

If the construction of proposed wastewater treatment facilities proceeds in accordance with projected schedules, and if all wastewater treatment facilities are properly maintained and operated, meeting effluent limitations established in Section 303(e) Basin Plans, all streams which are presently assigned classifications and water quality standards for the protection of fish and wildlife propagation and secondary recreation will meet these standards. However, it is anticipated that total compliance with these standards will not occur until after July 1977, because of time constraints required to meet recent standards revisions and delays in completing municipal facilities scheduled under the grants program.

STREAMS WHICH WILL NOT MEET 1977 GOAL. There are presently 180 streams or segments of streams, comprising a total of 596 miles, which remain Class "D". Of these, 19 stream segments of 96 miles of streams, have been approved by the Regional Administration, EPA, for the retention of the "D" classification, due to naturally poor quality, man-made pollution or technological limitations. The remaining 161 stream segments are presently being evaluated and will be given consideration for upgrading for fish and wildlife propagation, and secondary recreation upon completion of the evaluations. Final action is scheduled to be taken relative to these streams during FY 1977.

- **Attainment of Swimmable (1983) Goal**

Evaluation of the waters in the state for swimming uses over and above the 8.4 percent presently assigned classifications and water quality standards for the protection of such uses has yet to be accomplished. It will be necessary to conduct rigid evaluations and studies of all of the streams in the State to determine the best usage and the quality of the waters prior to an assessment of those streams which will be acceptable for swimming uses. Since this must be done, it is reasonable to assume that such will not be completed until mid-1977. In the meantime, the further development of the continuing planning process, particularly the acquisition of data generated from studies in the designated Section 208 areas will provide valuable information which can be used in the evaluations.

Upon completion of the evaluations, proposals for reclassification will be submitted to the Regional Administrator, EPA, for comment and approval. Subsequently, proposals will be submitted to the Environmental Management Commission for authorization of public hearings for consideration of the proposals for reclassification or retention of the presently assigned classifications. Upon completion of this process, it will be possible to project the attainment of the 1983 water quality goals.

APPENDIX A

Summary - State of North Dakota

Complete copies of the State of North Dakota 305(b) Report can be obtained from the State agency listed below:

Division of Water Supply and Pollution Control
Department of Health
Bismarck, ND 58505

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Summary and Evaluation

An evaluation and comparison of surface water quality has been determined from data compiled from the North Dakota State Department of Health Water Quality Monitoring Program. Data from calendar years 1972 and 1975 were used for the evaluation and comparison. The monitoring stations selected involved the four major river basins in the State as follows:

Missouri River Basin	4 Stations
James River Basin	2 Stations
Red River Basin	3 Stations
Souris River Basin	1 Station

Six parameters of quality were compared at each station. Identical parameters were used for each station. The Department's Surface Water Quality Standards, revised in the fall of 1973, were used as a basis for determining the number of violations which occurred for each of the years noted above for the comparison and evaluation. The following is the sum total of all violations noted for each of the six parameters covered in this study:

	Calendar year 1972	Calendar year 1975
Dissolved oxygen	5	4
Phosphates (PO4)	44	50
Coliform	57	19
Fecal coliform	35	18
Total dissolved solids	42	33
Chlorides	0	1

Due to a change in laboratory procedures, nutrients (nitrates and phosphates) are discussed in the non-point pollution section which appears later in the report.

For waters suitable for recreation, fishing and wildlife, the prime parameters considered are dissolved oxygen, coliform and fecal coliform bacteria and nutrients. Total dissolved solids and chlorides are of lesser importance for the above-noted users, but have influence on quality as it relates to municipal, industrial and agricultural users.

While the total number of dissolved oxygen violations was not considered high in 1972, the number of violations in 1975 dropped to four. This is a 20 percent reduction. Reductions in coliform and fecal coliform violations were 67 percent and 49 percent from 1972 to 1975. There was a 12 percent increase in phosphate violations noted in 1975 as compared to 1972. The number of noted TDS violations were reduced 22 percent from 1972 to 1975. Only one chloride violation occurred. This occurred in 1975.

The surface waters at the stations evaluated in this report met the State's Water Quality Standards for dissolved oxygen, coliform, fecal coliform bacteria and total dissolved solids more consistently in 1975 than in 1972. Based on the reduced number of violations for these four parameters, there was an improvement in water quality, relative to these parameters, from 1972 to 1975. As there was an increase in the phosphate violations, this indicates that there was a degradation of the surface waters, relative to this parameter from 1972 to 1975. The appearance of one chloride violation in 1975 cannot be considered to constitute a degradation of the surface waters for the chloride parameter at these stations.

Stream flows are a factor that must be considered in quality control. Comparative stream flows for the two years evaluated reveal that flows in the James River were considerably higher in 1975 as compared to 1972, while flows in the Souris River were slightly higher in 1975 as compared to 1972. Flows in the Red River Mainstem were higher in 1975 compared to 1972, but flows in the Sheyenne River (one of its tributaries) were about the same for the two years. Flows in the Missouri River Mainstem were about the same, while flows in the Little Missouri River (one of its tributaries) were lower and flows in the Heart River (another tributary) were slightly higher in 1975 compared to 1972. The Department, based on a considerable number of years of stream sampling and survey experience, has noted that stream water quality, following spring thaw runoff or rains and during higher flows will usually have the following characteristics as compared to low flow conditions: (1) Increased coliform counts normally after runoff from spring thaw or rains; (2) Lower TDS; and (3) generally no corresponding drop in phosphates which would be compatible with the lower TDS. The streams in the western half of the State, with the exception of the Mainstem Missouri River, have historically had high TDS due to springs feeding the streams and soil conditions in that area. The Department expects to conduct further stream studies on some of these streams (note discussion on non-point sources in the report) to determine possible problem areas. It is possible that the State's Water Quality Standards for TDS and phosphates are too stringent as they presently apply to these streams even though all controllable point and non-point source problems can be handled satisfactorily.

With the exception of a few installations, all municipal treatment facilities use the waste stabilization lagoon method of waste treatment. The use of these facilities enables the municipalities to hold all wastes from discharging to the receiving streams during cold weather months when streams are ice-covered. Discharges from these facilities are made only with Departmental approval and generally under open water conditions. Exceptions would occur when the facility does not have adequate retention capacity. The municipalities with inadequate capacities are on the Department's priority listing for future Federal grant funding when available.

APPENDIX A

Summary - State of Ohio

Complete copies of the State of Ohio 305(b) Report can be obtained from the State agency listed below:

Ohio Environmental Protection Agency
P.O. Box 118
Columbus, OH 43215

Since the State of Ohio did not provide a short summary in its 305(b) Report, this summary consists of selected excerpts from that report.

Water Quality in Ohio

The water Pollution Control Board, the first organization for the control of water pollution in Ohio, was established by law in 1951. During its 20-year existence, it established and administered a water permit system. Public and industrial entities spent over $1 billion each on water pollution abatement equipment during its existence.

On October 23, 1972, the Ohio EPA was formed by consolidating environmental programs from several State departments into one agency. These included the Water Pollution Control Board and portions of the water planning functions operated under the Ohio Department of Natural Resources. The Ohio EPA water pollution control programs are designed to be consistent with the requirements of PL 92-500. The Ohio EPA currently administers the NPDES permit system for the State, performs ambient water quality surveillance, and develops State water quality standards. To date, Ohio EPA has issued 3,244 permits to both municipal and industrial sources.

Data used in this report were compiled during water year 1975 (October 1974 through September 1975). The sampling program consisted of 124 sites which were sampled on a regular basis for a variety of chemical parameters. Table 1 lists the major drainage basins of the State along with the number of Ohio EPA ambient sampling stations located both on the mainstem and tributaries within each basin. Data from other sources were used wherever possible.

For the purposes of this report, the State of Ohio was divided into four regions. Figure 1 illustrates the four regions of the State, while Figure 2 shows the major rivers in each region. An analysis of the water quality in each region is provided in the report.

TABLE 1

MAJOR DRAINAGE BASINS IN OHIO WITH NUMBER OF AMBIENT SAMPLING STATIONS*

Stream	Mainstem	Tributaries	Total
Lake Erie Drainage Basin			
Maumee River Basin	3	19	22
Portage River Basin	1	–	1
Sandusky River Basin	2	1	3
Huron River Basin	2	–	2
Vermilion River Basin	1	–	1
Black River Basin	1	–	1
Rocky River Basin	2	–	2
Cuyahoga River Basin	5	7	12
Chagrin River Basin	1	–	1
Grand River Basin	1	–	1
Ashtabula River Basin	1	–	1
Conneaut Creek Basin	1	–	1
			48
Ohio River Drainage Basin			
Mahoning River Basin	6	3	9
Muskingum River Basin	–	–	–
Scioto River Basin	3	14	17
Hocking River Basin	6	5	11
Great Miami River Basin	7	18	25
Mill Creek Basin	3	1	4
Little Miami River Basin	4	6	10
			76
			124

*In addition, data from intensive survey stations or other sources are included in the report wherever possible.

FIGURE 1

REGIONS IN OHIO SHOWING MAJOR DRAINAGE BASINS

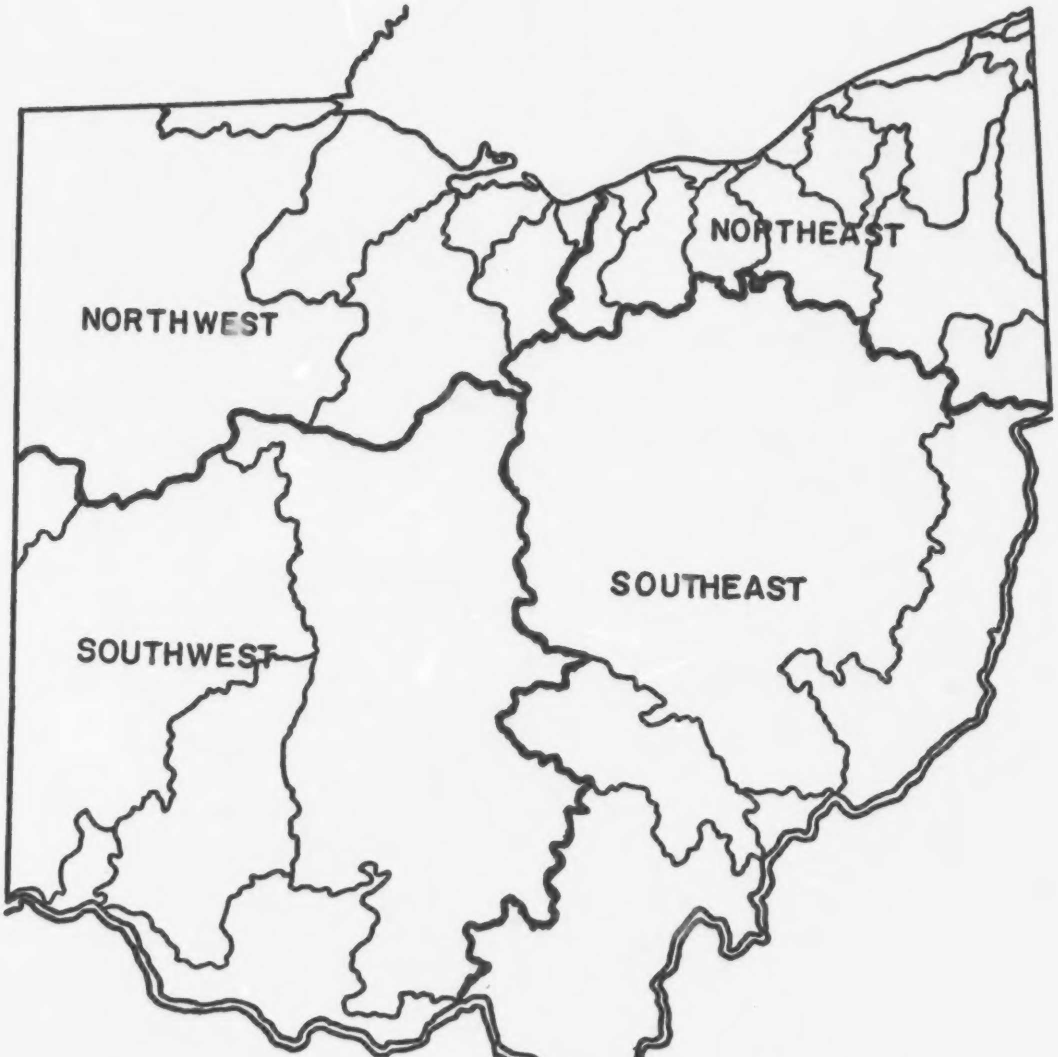
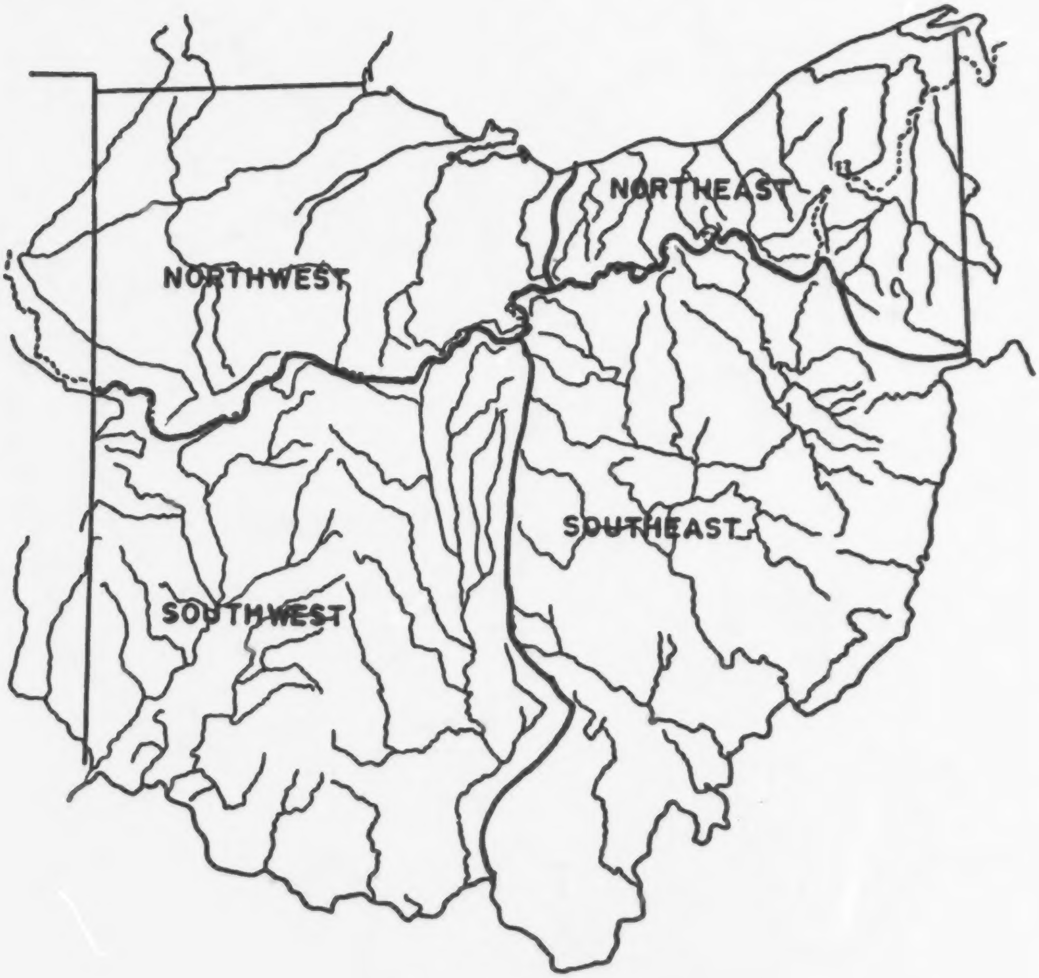

NORTHWEST
NORTHEAST
SOUTHEAST
SOUTHWEST

FIGURE 2
REGIONS IN OHIO SHOWING MAJOR RIVERS


NORTHEAST
NORTHWEST
SOUTHEAST
SOUTHWEST

Relationship to National Goals

With the implementation of the provisions of the Act, water quality will improve in varying degrees throughout the State; however, the goals of "fishable, swimmable" waters will not be met at all times in all waters of the State.

Small streams receiving effluents from significant dischargers (where the effluent comprises 60 percent of the stream flow at low flow conditions) will not meet these goals even with "best available control technology economically achievable" (BACTEA) at all point sources. Water quality problems resulting from non-point sources and natural seasonal change will not be affected by the achievement of BACTEA, and will continue to cause water quality standards violations and limit water uses.

The remainder of this chapter is devoted to a description by region of the problem areas that will exist after BACTEA is achieved at all point sources.

Northwest Region

Numerous small tributaries in the Maumee River Basin will continue to experience problems associated with rural septic tank dischargers and non-point sources.

Significant dischargers located on small tributaries will limit water uses in the Huron and Portage River Basins. These areas in the Portage Basin include Rader Creek below McComb, Wolf Creek below Gibsonburg, Bull Creek below Jersey City, and Poe Ditch and the North Branch below Bowling Green. Poe Ditch and the North Branch are significant problem areas in the Portage. Poe Ditch is essentially dry except for the discharge from the Bowling Green sewage treatment plant. Little dilution is available from the North Branch during dry weather. Achievement of Water Quality Standards in these two streams is uncertain. Jacob Creek below Willard and Rattlesnake Creek below Norwalk are similar areas in the Huron River Basin.

In the Sandusky, most areas will be suitable for public, industrial, and agricultural water supplies, and will support a diverse community of warm water fish. Combined sewer overflows will continue to restrict uses below municipalities (particularly Bucyrus and Fremont).

Northeast Region

Water quality in the Vermilion, upper Black, upper Grand, Rocky, Ashtabula except Fields Brook, upper Cuyahoga, Little Beaver, Chagrin and Conneau Creek will generally meet the intended uses of the Act. Primary contact recreation will be restricted in some areas due to bacterial contamination from non-point sources, and there will continue to be problems below some dischargers.

Fields Brook, (Ashtabula River Basin), the lower Mahoning, lower Cuyahoga, and the lower Grand, may not be suitable for all uses intended by the Act.

Future uses of the lower Grand River are dependent upon the future of the Diamond Shamrock facility. It is not economically possible for them to achieve effluent limitations that would permit attainment of stream standards for dissolved solids and chlorides. To meet the current stream standards, Diamond Shamrock will have to re-route their discharge to Lake Erie or shut down their plant. The other alternative is a modification of stream standards for this section of the river. Until this situation is resolved, future uses of the water cannot be estimated.

Because of the high concentration of industrial and municipal dischargers to the lower Cuyahoga River, it became necessary to modify stream standards in this area. This portion of the river has been designated as an industrial water supply and secondary contact recreation.

The mainstem of the Mahoning from Warren to the State line and Fields Brook in the Ashtabula River Basin will be suitable for industrial water supply only.

Southeast Region

With a few exceptions, all streams other than mining streams in this region will meet all intended uses of the Act. Dissolved oxygen and fecal coliform violations will probably continue to occur below major population centers, and sewage treatment plants, limiting primary contact recreation and aquatic life in these areas.

A problem peculiar to this region which will not be solved by the application of "best available treatment" is that of streams affected by mine drainage. Many streams, including Moxahala Creek, Brush Creek, and some smaller tributaries, are severely degraded by acid mine drainage from abandoned strip and deep mines. These are, to a great extent, non-point sources for which no "best available treatment" exists. This drainage can only be eliminated by long-term land reclamation programs.

Upper Stillwater Creek, among others, is severely affected by neutralized mine drainage, containing high concentrations of dissolved solids and sulfates. This problem is due to both active and inactive mining, and will be solved only by long-range land reclamation.

Southwest Region

Most areas in this region will be suitable for all uses except primary contact recreation due to bacterial contamination from non-point sources.

Areas that will not meet the 1983 goals even with BACTEA at all point sources are: Duck Creek (Little Miami), lower Mill Creek and West Fork of Mill Creek, Scioto River below Columbus, Paint Creek (Scioto River) below Mead Paper, and Little Scioto River below Marion.

Duck Creek in the Little Miami River Basin received combined sewer overflow discharges from the Cincinnati area and, hence, will not be suitable for primary contact recreation.

The West Fork of Mill Creek and the lower Mill Creek will be suitable only for industrial water supply even with BACTEA at all point sources because of the Cincinnati bypass system.

The volume of effluent with respect to stream flow is the problem in the Scioto River below Columbus. During critical flow times effluent from the city of Columbus accounts for almost 95 percent of the stream flow in the Scioto River downstream of the city, Dissolved oxygen will be the problem parameter.

Available technology is the limiting factor for the area in Paint Creek below Mead Paper. Violations of dissolved oxygen will continue to occur; however, the magnitude of the violations should be small.

Modeling for the 1974 Waste Load Allocation Report indicated that better than BACTEA must be achieved by industrial and municipal dischargers in the Little Scioto River from Marion to the mouth to meet water quality standards.

Control Actions and Costs

Section 305(b) of PL 92-500 requires that an estimate be made of: (1) the environmental impact; (2) the economic and social costs necessary to achieve the objectives of the Act; (3) the economic and social benefits of such achievement; and (4) an estimate of the date of such achievement.

No new information has become available for assessing these areas since the 1975 305(b) Report was written. The best estimate of costs in Ohio can still be found in the 1974 Ohio Municipal Needs Survey which was submitted to the EPA in August, 1974. The summary sheet abstracted from that report is shown as Table 2. An estimate of $7,647 million was made of the costs of building wastewater treatment plants, repairing and rehabilitating sewer systems, and building new interceptor sewers. In addition, an estimate of $6,570 million was made for the collection and treatment of storm waters. The combined total is $14,217 million. This is a per capita cost of $600, based on projected 1990 population.

TABLE 2

MUNICIPAL WASTEWATER TREATMENT FACILITIES—1974 SURVEY OF NEEDS

		June 1973 (Millions of dollars)
Category I:	Facilities to meet "secondary treatment"	26
Category II:	Facilities to meet advanced treatment or water quality standards	1,508
Category IIIA:	Sewer costs for correcting "infiltration/inflow" problems	635
Category IIIB:	Sewer costs for replacement/rehabilitation	115
Category IVA:	Construction of collection sewers	626
Category IVB:	Construction of new interceptors	946
Category V:	Correction of bypassing problems due to combined sewers	3,790
Sub-total		7,646
Category VI:	Treatment and control of storm waters	6,570
Total		14,216

The survey shows $26 million is required at plants which must meet "secondary treatment" levels, with $1,500 million needed at plants required to meet an effluent limitation more stringent than secondary treatment. An evaluation of the basis for these totals indicated two important facts: (a) the need for advanced wastewater treatment to meet water quality standards due to the prevalence of low flow streams in Ohio; and (b) the pollution abatement program conducted in Ohio prior to the enactment of PL 92-500 resulted in the installation of facilities designed for secondary treatment.

The cost of the needed sewer systems in Categories III and IV total $2,322 million, while the costs of correcting bypass problems associated with combined sewers was $3,790 million. The cost for treatment of storm waters in urban areas was estimated at $6,570 million.

A correcponding estimate was made for the cost of industrial wastewater treatment facilities, as shown in Table 3. The $386 million is on the low side because of the exclusions noted. The costs for very small facilities were not estimated, although the total cost could be substantial because of the large number.

The use of alternative approaches to solving pollution problems, and the social and economic factors involved are worthy of discussion. One example of this is the elimination of phosphorus from wastewater by banning the use of phosphate containing detergents. This approach was taken by the City of Akron as an alternate to removing phosphorus from the wastewater to meet the requirements of the International Joint Commission (IJC) agreement. The IJC agreement imposes an effluent limitation of 1.0 mg/1 phosphorus (as P) on all municipalities discharging over 1.0 MGD into the Lake Erie drainage basin.

The City of Akron imposed a ban on phosphate containing detergents effective January 1973. All of the suburbs of Akron that are tributary to the Akron wastewater treatment system instituted phosphate detergent bans by May 1973. These actions reduced the phosphorus entering the wastewater treatment facility by 14 percent between 1972 and 1973. This was followed by another 14 percent reduction in influent loading in 1974. The effluent from the facility decreased with time as the stock of phosphate detergent was used up. The data show that the phosphorus concentration was approaching the limitation of 1.0 mg/1 at the end of 1974. There appears to be a seasonal effect superimposed on a long period trend in that the concentration data for the spring months of 1973, 1974, and 1975 are about equal. However, there is a significant difference in concentrations for the fall months of 1973 and 1974. The concentrations for the fall months of 1975 are about equal with the fall months of 1974. If the indicated trend continues, the City of Akron may achieve the phsophorus limitation by the alternative means.

Very intensive assessment of the social and economic costs and benefits of attaining the objectives of the Act will be required in several areas in Ohio where a combination of natural conditions and long-term industrial/municipal development has resulted in a water use pattern that may prevent the attainment of all of the goals of the Act. Two areas that illustrate this are the lower Cuyahoga River and the mainstem of the Mahoning River. The Ohio EPA has recognized the special problem of the lower Cuyahoga River by adopting special water quality standards, EP-1-09, that classified the water for use as an industrial water supply and secondary contact. In addition, the need for a minimum dissolved oxygen level was eliminated for the late summer months. The water quality standards for the Mahoning River are still under consideration.

Major industry in Ohio can be placed in two categories: Those with, and those without effective NPDES permits. Ohio law and regulations do not allow an NPDES permit to become effective if an adjudication hearing has been requested. Approximately 50 percent of the major industrial dischargers fall into that category.

The report persents the compliance status for Ohio major dischargers with effective NPDES permits. For those industries that received permits in 1973 and 1974, both approval of plans and completion of construction were ahead of the schedules in the NPDES permits. In many cases, the industry was at or near compliance when the NPDES permit was issued and became effective. Portions of the initial planning was completed by many industries before the NPDES permits became effective. As abatement programs continued, the plans were approved and construction completed as the permits became effective. Therefore, looking at this partial grouping, the compliance picture appears optimistic.

For the remaining permits in the adjudication process, it is an entirely different situation. In this group, many will not meet the statutory deadline of July 1, 1977 due to a lack of Federal effluent guidelines and time to construct necessary facilities. Currently, many industries are caught in an impossible situation where they cannot meet the July 1, 1977 deadline and, therefore, cannot obtain a permit that places them on a compliance schedule. Until changes are made in PL 92-500, this problem will continue. Extensions beyond the July 1, 1977 compliance date must be permitted on a case-by-case basis.

Non-point Sources

Reduction of potential pollution hazards from non-point sources on all lands in Ohio could be aided greatly by a strong policy on proper land use. Improper uses and rapid changes in land use result in runoff and erosion. Much of the land in Ohio that would be best suited for agriculture is being used for urbanization development and highways. In 1960, non-agricultural uses of land accounted for 3.5 million acres. A figure of 5.5 million acres in non-agricultural uses is projected for 1985 and 7.1 million acres by the year 2000.

Harvested cropland is expected to decrease by 15 percent by the year 2000. This decrease will be accompanied by a reduction in the overall quality of the cropland, since less productive land will be brought into cultivation. This will result in an increased cost of crop production per acre as well as increases in potential erosion, runoff and other pollution hazards.

Problems with non-point source pollution are generally associated with rainfall and the resulting high flows in the streams and rivers. These problems, therefore, tend to be most severe in the late winter-early spring season in contrast to the critical period in late summer for point sources of pollution. Non-point pollution in Ohio is derived from agriculture, mining, construction and urban runoff sources.

TABLE 3

COST ESTIMATES IN OHIO FOR INDUSTRIAL WASTEWATER POLLUTION ABATEMENT FACILITIES

Hocking River	$ 480,000
Scioto River	3,060,000
Grand and Ashtabula Rivers	1,330,000
Maumee River	9,680,000
Sandusky River	1,430,000
Central Ohio River and Tributaries	39,850,000
Tuscarawas River	11,730,000
Little Beaver River	530,000
Southeast Ohio River and Tributaries	29,700,000
Southwest Ohio River and Tributaries	5,310,000
Little Miami River and Mill Creek	380,000
Huron, Vermilion and Black Rivers	17,960,000
Rocky, Chagrin and Cuyahoga Rivers	60,660,000
Great Miami and Wabash Rivers	18,910,000
Walhonding River	1,550,000
Portage River	600,000
Muskingum River	13,160,000
Mahoning River	127,700,000
Lake Erie	41,980,000
Total	$386,000,000

NOTE:

- The cost figure was arrived at by estimating on a permit-by-permit basis the approximate cost per facility. All costs for entities located within a defined drainage area were tabulated and added to come up with the totals by basin. Then the costs for all drainage basins were added together for the total statewide cost figure.
- All industrial permits (manufacturing and business service entities) and proposed permits on file with Central Office WM&E as of February 7, 1975 were used for cost estimating. Surface mine abatement costs were included by basin for three hundred mines.
- Existing power plants' costs for pollution sources other than thermal were estimated, but costs for cooling facilities at Hutchings, Gavin, and Davis-Besse were included.
- This estimate did not include costs on abatement facilities at the municipal power plants, state-owned power plants, water treatment plants, gas stations, agricultural runoff, and general non-stream runoff from most industrial manufacturing sites, pretreatment of industrial wastes going to municipal sewage plants, and cooling facilities for most of the public utility steam electric power plants.

APPENDIX A

Summary - State of Oklahoma

Complete copies of the State of Oklahoma 305(b) Report can be obtained from the State agency listed below:

Department of Pollution Control
Box 53504
N.E. 10th & Stonewall
Oklahoma City, OK 73105

Summary

In this report an attempt has been made to evaluate the surface waters in Oklahoma using, with one exception, major streams or stream segments. Most pollution, on the other hand, occurs in the smaller streams where the flow is less and the impact greater. In addition, there have been approximately 2,000 sample sites selected. This monitoring program is less than five years old and oriented toward quality control. In some areas, monitoring has begun the last year or two. This monitoring program has been directed primarily at the smaller streams where problems are more likely to occur. One result of this is that more is known about streams like Cottonwood Creek near Oklahoma City than about its parent stream, the Cimarron River.

It has also been pointed out that this report does not address itself to toxicity parameters such as heavy metals, pesticides, phenols, etc. Because of this, a stream may appear to be of good quality when it might contain significant amounts of toxic materials. A separate report has been prepared by the Oklahoma State Department of Agriculture relative to chlorinated hydrocarbon pesticide residues in Oklahoma streams indicating that, in general, few problems exist. Additionally this report does not address itself to bacteria. It is unfortunate that there are insufficient data on these parameters for adequate evaluation. However, toxicity parameters can sometimes be correlated with other parameters. For example, increase in phosphate and nitrate values from agricultural areas can indicate a concurrent rise in pesticide concentrations.

This is the second major attempt at a statewide evaluation of water quality and it has served as a learning experience. Additionally, it points out certain deficiencies, both in quality of the water in certain areas and the monitoring program in others. Steps have already been taken to correct some of these deficiencies by reviewing the monitoring program with an eye toward more data of a uniform nature to be available for the next evaluation.

In evaluating each stream, two evaluations were made: Trend-over-distance evaluation for 1975 water year data; and trend-over-time for all available data. The trend-over-distance evaluations show that most of our streams, as expected, are of better quality near the headwaters than near the mouth resulting in overall decreases in quality. This decrease in quality is most often due to the increasing mineral content of the water with nutrients, usually, but not always, being an additional degradation factor.

The trend-over-time study shows a mixture of trends with some major streams improving, others becoming worse, and two remaining fairly uniform. This was again due to mineral values with all but a few major streams showing overall improvement in nutrient values.

Because this evaluation used unweighted values, mineral values tended to dominate the general quality except in southeastern Oklahoma where minerals and nutrients are of the same order of magnitude. Relatively severe problems with minerals occur in the Elm and North Forks of the Red River, the Cimarron River, and the Salt Fork of the Arkansas River. Streams with major nutrient problem areas include the North Canadian River, the Deep Fork of the Canadian River, and the Arkansas River below Keystone Dam.

Major non-point mineral sources include the salt and gypsum formations in the drainage of the Elm Fork of the Red River, the Great Salt Plains on the Salt Fork of the Arkansas, and the drainage of the Salt Creek near Watonga. Nutrient non-point sources include agriculture areas in the southwest and recreation areas along the lakes. Urban area non-point sources contribute to both mineral and nutrient levels as well as many other problem-causing compounds.

These urban areas also include the majority of the point sources. Urban areas in the State include the Oklahoma City metropolitan area (Oklahoma City, Edmond, Midwest City, Norman, Moore, etc.), the Tulsa metropolitan area (Tulsa, Sapulpa, Broken Arrow, etc.), Muskogee and Lawton-Ft. Sill.

Streams with the best quality include the Little River near Broken Bow, the Kiamichi River, and the Illinois River. Those with the porrest quality are those mentioned earlier in connection with mineral and nutrient problems. Only two streams, the North Fork of the Red River and the Salt Fork of the Arkansas, were in violation of the annual stream standards. Those violations were apparently due to non-point mineral sources.

Monitoring was least intense in the southwest and the north central parts of the State and most intense in the central and eastern parts. Mineral data were available more often than was nutrient data.

The final summary, based on available data, is that the major streams in Oklahoma, although there were problem areas, were in fair condition in the 1975 water year, and are apparently improving as a result of point source control. Intensified control of point source discharges as implementation schedules approach 1977 will result in further upgrading. Nutrient control for point sources may be necessary to upgrade tributary quality. Non-point source control particularly oriented toward minerals would greatly enhance statewide quality.

APPENDIX A
Summary - State of Oregon

Complete copies of the State of Oregon 305(b) Report can be obtained from the State agency listed below:

Oregon Department of Environmental
Quality
1234 W. Morrison St.
Portland, OR 97205

Summary and Conclusions

Oregon's basic water quality control program remains essentially as it was described in the Department of Environmental Quality's (DEQ) water quality control status report of April, 1975.

The major activities and accomplishments of the Department's water pollution control program over the past year were in the following categories.

Monitoring and Surveillance

The DEQ revised its water quality monitoring network, pursuant to EPA regulations, and implemented the prescribed system of primary and secondary stations. Instead of continuing the use of some 1,000 stations statewide, the Department now utilizes a total of 74 stations — 9 in the primary category and 65 as secondary stations. Primary stations were located at critical points in major streams statewide. They will be sampled once per month, year after year to establish long-term trends in water quality. Secondary stations were generally located on lesser streams or on tributaries to large streams, and they will be sampled monthly for one year out of each three-year period.

Any monitoring in addition to that at regular primary and secondary stations will be classified as special studies. In effect, the monitoring schedule will require full coverage of the State every three years.

A broader range of analyses will be made on the fewer samples. Potentially deleterious substances in solution will be given greater attention and scrutiny.

Non-Point Source Wastes

Pursuant to Section 208 of PL 92-500, the DEQ has begun the development of an intensive program for dealing with the statewide impacts of non-point source wastes on water quality. The EPA recently granted the State $1.2 million to be matched by $400,000 in State monies to fund six program elements:

Forest practices	$ 140,000
Agricultural practices	347,000
Septic tank and vault toilet sludge disposal	100,000
Assessment of non-point source waste impacts	345,000
Coordination of land use planning	50,000
Water quantity-quality management	25,000
Program management (staffing and services)	593,000
Total	$1,600,000

The program funding begins with FY 76 and will be effective through November, 1978.

Oregon designated four areas in the State for local Section 208 planning efforts. The local Council of Governments at Portland, Salem, Eugene and Medford are in charge of these operations.

Status of Water Quality

The quality of Oregon's waters remains good, adequate to serve the recognized beneficial uses where quantities remain sufficient. Standards are generally met throughout the State. Statewide water quality monitoring still shows three major water quality aberations: (1) Seasonal turbidity increases paralleling peak runoff periods; (2) seasonal coliform bacterial elevations, also aligned with runoff intensity; and (3) elevated stream temperatures due to solar heating on diminished flows. While these three aberations are not truly violations of water quality standards, they are undesirable conditions that man may improve through better land and water use practices. Thus, it is that these three aberations are the focal points of the statewide Section 208 planning process.

Flows in the Tualatin River were augmented from the Scoggin Dam project for the first time in the summer of 1976. Minimum summer flows were increased from essentially zero in the middle sections to a minimum of 250 cfs. The net result was a stream that met water quality standards for the first time in many years.

The State's 1975 water quality status report identified major ammonia waste loads that exerted excessive dissolved oxygen demands on the Willamette River. These waste sources have been substantially reduced to the point of little measurable impact in 1975. Further evaluation studies of the matter will be conducted during low flow, 1976.

Water Quality Permits

In early 1976, the DEQ developed a fee schedule for processing water quality permits and conducting the required compliance inspections. It becomes effective on all permit renewals after July 1, 1976.

In the 1975 305 (b) Report, the DEQ stated that it had received 785 applications for NPDES permits; 526 were issued, and 259 were pending. As of June 1, 1976, the DEQ had received 795 NPDES applications: 768 have been issued and 27 are pending. Also, 126 State water quality permits, out of a current total of 149, have been issued.

Log Handling Policy

In 1975 the DEQ developed a policy for managing log handling in public waters. Its basic tenets are for easy let-down devices to minimize wood debris generation at log dumps and positive methods for log debris collection and removal from the water. Further, it will restrict the handling of logs in waters where water quality standards are not met.

Sewerage Works Construction

In the 1975 report, four communities were listed as discharging sewage with no treatment. Since then, treatment facilities have been placed in operation in Senaca and Nehalem (North Tillamook County Sanitary Authority). Cloverdale Sanitary District facilities are under construction. Facilities for Wheeler will be under construction as soon as a Step III grant is awarded.

In early 1975, the Unified Sewerage Agency of Washington County initiated construction of a 15.0 MGD advanced waste treatment plant. The Agency's consultant proposed to complete the project under a Construction Management Services (CMS) approach. The consultant projected savings at two million dollars and 9 months in time over the traditional contracting approach of construction. As of this time, the project savings are projected to be the original $2 million plus another $2.5 million.

All savings in time and money were accomplished within existing grant rules and regulations. It appears CMS can be a useful tool in sewerage works construction.

APPENDIX A

Summary - State of Pennsylvania

Complete copies of the State of Pennsylvania 305 (b) Report can be obtained from the State agency listed below.

Pennsylvania Department of Environmental Resources
Bureau of Water Quality Management
P.O. Box 2063
Harrisburg, PA 17120

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Introduction

This is the second in a series of annual publications prepared in response to Section 305(b) of PL 92-500 which requires the States to report an annual assessment of water quality. This report, prepared by the Bureau of Water Quality Management, Pennsylvania Department of Environmental Resources, provides an opportunity to report both to Congress and to Pennsylvanians on progress that has been made in water pollution control and on problems that remain. This year's report is more comprehensive and detailed as compared to the initial 1975 report and reflects an improved data base over last year. Much of the information again comes from estimates made by staff members familiar with local areas. This information, coupled with data collected through special surveys, routine monitoring, and data available from other governmental agencies gives us the picture presented in the report.

In future years, we expect to have a more precise data base for report preparation because of information being developed in the current Comprehensive Water Quality Management Program (COWAMP) now under way in our State. The COWAMP program will identify specific water quality management problems, propose solutions to the problems and provide for future monitoring.

Pennsylvania has had a sewage pollution control program since 1905. The State's first comprehensive water pollution control legislation was enacted in 1937 and is known as the "Clean Streams Law". This law has been strengthened by amendments a number of times, the most recent being in 1970. It provides the State with an excellent legal framework for managing water quality. Most of the past emphasis in Pennsylvania's water quality management program, as well as those of the rest of the Nation, has been toward elimination of point source pollution (sewage and industrial waste discharges). However, pollution from non-point sources, such as storm runoff, abandoned mine drainage, agricultural and earth moving operations, and discharges of polluted ground water has significant adverse impact in some areas of the State.

Much has been accomplished in pollution abatement in the State and there is a trend of water quality improvement. There are, however, a number of significant problems that remain and a need for major resources to correct these problems.

Summary

Pollution Sources

Water pollution problems in Pennsylvania are attributable to a variety of sources. The sources are considered in two general categories: Point and non-point sources. Point sources are those such as sewage discharges, industrial waste discharges and storm or combined sewer drainage that are conveyed to a water body in a pipe or channel. Non-point sources include discharges of polluted ground water, storm water runoff, drainage from abandoned mines, and agricultural runoff. In addition to the point and non-point source pollutants, many of which are chronic in nature, problems of an acute nature are created by the addition of substances in the State's waters through spills and accidents which are most often related to storage or transport of materials.

The State of Pennsylvania has a total area of approximately 45,333 square miles. Pollution problems vary with the population concentration, type of industry or mineral resources in an area, and very often the geology and topography of an area. The nearly 12 million people who live and work in Pennsylvania are not uniformly distributed over the State and, therefore, the intensity of population-based pollution problems are not uniformly distributed.

In areas with heavy industrial and population concentrations, sewage and industrial wastes are the major pollution sources. Storm and combined sewer runoff add to the pollution problems. In western and parts of central Pennsylvania, drainage from bituminous coal mines (primarily abandoned mines) creates serious water quality problems. The same situation exists in the anthracite area of northeastern Pennsylvania. Approximately 2,000 miles of major streams in Pennsylvania are adversely affected by drainage from abandoned coal mines. Figure 1 shows the magnitude of the mine drainage problem in the State's major river basins.

Other pollution sources in Pennsylvania include oil well and refinery operations in northwestern Pennsylvania, construction and other earth moving operations which have created serious erosion and sedimentation problems, and a significant number of power plants scattered throughout the State which discharge heat – also a potential pollutant.

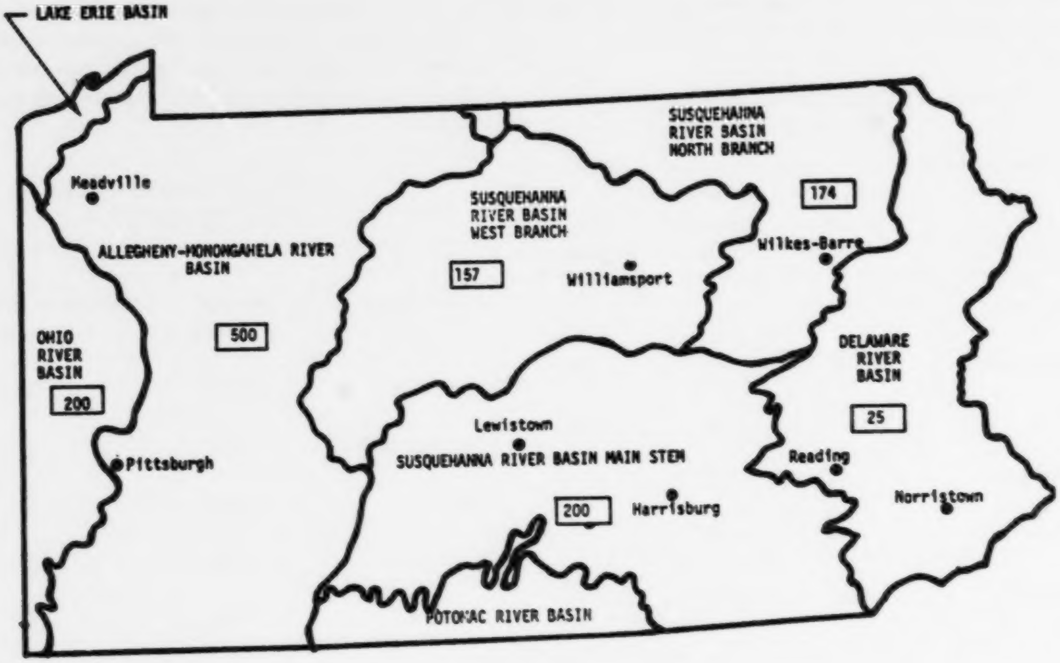
A description of the State's water pollution control program can be found in the annual State strategy and program plan prepared by the Bureau of Water Quality Management and submitted to the U.S. Environmental Protection Agency.

Assessment of Water Quality

The success or effectiveness of Pennsylvania's water quality management program can best be measured by the improvement in quality of polluted or degraded water and by the adequacy of protection of good quality waters. From 1971 through 1975, there was a net increase of 712 miles of State streams showing improvement. In 1975, 152 miles of streams improved, while 37 miles were degraded for a net gain of 127 miles of streams improved during the year. The major improvement was 40 miles of the Ohio River mainstem, which was due to upgrading from primary to secondary treatment at the Allegheny County Sanitary Authority and smaller treatment plants along the Ohio River. A second major improvement occurred in 12 miles of the Monongahela River (Greene and Fayette Counties) and

FIGURE 1

TONS OF ACID DISCHARGED PER DAY BY THE MAJOR RIVER SYSTEMS OF PENNSYLVANIA


LAKE ERIE BASIN
Meadville
ALLEGHENY-MONONGAHELA RIVER BASIN
500
OHIO RIVER BASIN
200
Pittsburgh
SUSQUEHANNA RIVER BASIN WEST BRANCH
157
Williamsport
SUSQUEHANNA RIVER BASIN NORTH BRANCH
174
Wilkes-Barre
DELAWARE RIVER BASIN
25
Lewistown
SUSQUEHANNA RIVER BASIN MAIN STEM
200
Harrisburg
Reading
Norristown
POTOMAC RIVER BASIN

was due to mine drainage abatement activities. Shorter stretches of more than 40 other streams throughout the State showed improvements due to upgrading or elimination of waste discharges, mine drainage treatment and abatement activities, and changes in industrial operations.

A tabulation of stream quality changes (improvement and degradation for the years 1971 through 1975) is summarized by major drainage basin below. A detailed tabulation can be found in Part I of the report.

PENNSYLVANIA STREAM QUALITY
(1971-1975)

Drainage basin	Miles of stream improved	Miles of stream degraded	Net improvement
Delaware	75	3	72
Susquehanna	349	96	253
Ohio	460	84	376
Lake Erie	31	25	6
Potomac	5	0	5
Total	920	208	712

Water quality standards were established for Pennsylvania's surface waters between 1967 and 1973. These water quality standards were designed to protect stream uses that would be possible if there were no pollution and included specific numerical water quality criteria to protect these uses. Water quality standards are in effect for all of the State's waters and are monitored routinely at 235 locations. We do not have monitoring stations or survey information on every stream. Part II of the report includes a meeting water quality criteria and an identification of the major problems. Major problems are further defined as to parameter group responsible for failure to meet water quality standards. If there are pollution problems, an indication of the progress toward correcting the problems is provided. These estimates are the best available at present.

Summarized below on the drainage basin basis is a status report on compliance with water quality criteria. On an overall basis, approximately 80 percent of the State's major streams comply with water quality criteria. Major streams are those with stream quality monitoring stations and those described in the 1917 *Pennsylvania Gazetteer of Streams.*

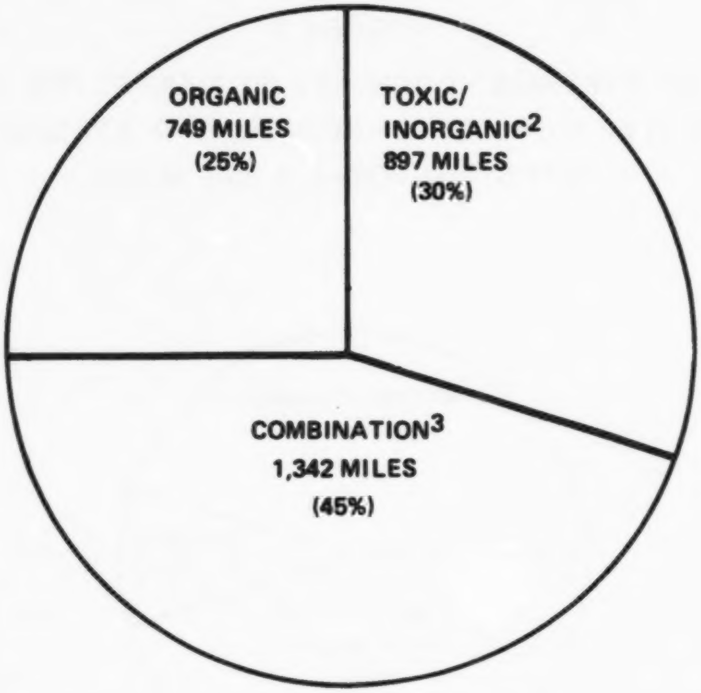
COMPLIANCE WITH WATER
QUALITY CRITERIA

Drainage basin	Miles of major streams	Percent of stream miles meeting criteria
Delaware	2,370	72
Susquehanna	6,434	80
Ohio	4,841	80
Lake Erie	100	90
Potomac	418	98

At the present time, 2,989 miles or approximately 20 percent of major stream miles in Pennsylvania fail to meet water quality standards. Abandoned mine drainage, either by itself or in combination with other pollution sources, is responsible for 75 percent (2,240 miles) of the stream miles degraded (Figure 2). Bacteria criteria are not included in water quality assessments due to lack of good data and experience has shown that due to the uncontrolled nature of non-point runoff, bacteria criteria are exceeded in most streams during some portion of the year.

FIGURE 2

MILES OF STREAMS NOT MEETING WATER QUALITY STANDARDS AND TYPES OF POLLUTION RESPONSIBLE 1975--TOTAL 2,988 MILES



ORGANIC pollution includes municipal and industrial wastes; farmland and urban runoff; and power generation and construction related pollutants.

TOXIC/INORGANIC pollution includes industrial waste, abandoned mine drainage, and oil and gas extraction related pollutants.

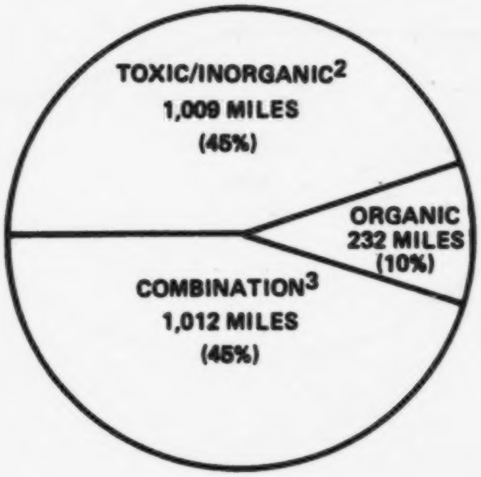
COMBINATION includes areas that have both ORGANIC and TOXIC/INORGANIC pollution sources.

Projecting to 1983, 2,253 miles of major streams in Pennsylvania will fail to meet established water quality goals. Mine drainage from abandoned mines, either by itself or in combination with other pollution sources, will account for 2,021 miles or 87 percent of the stream miles which are not expected to meet the established goals. (Figure 3).

It is apparent that progress in attaining the 1983 "fishable-swimmable" goals as set forth in PL 92-500 are being realized. Improved industrial waste treatment facilities and construction and upgrading of municipal facilities continues to result in improved water quality conditions. However, the magnitude of the non-point pollutional sources, especially abandoned mine acid drainage, will no doubt prevent the full achievement of the 1983 goals in Pennsylvania.

FIGURE 3

MILES OF STREAMS WHICH ARE NOT EXPECTED TO MEET 1983 WATER QUALITY STANDARDS AND STREAM MILES AFFECTED--TOTAL 2,253 MILES



ORGANIC pollution includes municipal and industrial wastes; farmland and urban runoff; and power generation and construction related pollutants.

TOXIC/INORGANIC pollution includes industrial waste, abandoned mine drainage, and oil and gas extraction related pollutants.

COMBINATION includes areas that have both ORGANIC and TOXIC/INORGANIC pollution sources.

Water Pollution Control Expenditures

Progress in water pollution control is brought about by investments at the local, State and Federal levels. Everyone pays for water pollution control through taxes, sewer bills and the cost of products. The following table presents some expenditure and pollution abatement needs that illustrate recent Federal and State government investments made in grants and abatement projects and some estimates of remaining needs. Cost figures were not available for the local share of municipal projects, but most of the grant funds for sewage treatment plant construction were made on a 75 percent Federal and 25 percent local basis. Cost data are not available for industrial investments at the present time. We expect to have improved estimates available in the future from the State's COWAMP program.

Estimates of storm water management need a considerable amount of refinement, but represent the best available data at present.

WATER POLLUTION CONTROL
EXPENDITURES (1971-75) AND NEEDS
(Millions of dollars)

	State and federal government expenditures	Estimated pollution abatement needs
Sewage collected and treatment	673	3,185
Abandoned mine drainage pollution and abatement	90	1,000
Industrial pollution abatement	(No data available)	(No estimate available)
Erosion and sediment control	1.5	(No estimate available)
Storm water management	(No data available)	9,300
Total	764.5	13,507

Supplemental Water Quality Reports

Water Quality Inventory Reports for the Delaware and Ohio Rivers as prepared by the Delaware River Basin Commission and Ohio River Valley Water Sanitation Commission are included in Appendix C of the report.

APPENDIX A

Summary - Puerto Rico

Complete copies of the Puerto Rico 305(b) Report can be obtained from the State agency listed below:

Environmental Quality Board
1550 Ponce de Leon Avenue
Santurce, PR 00910

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Summary

Current Water Quality and Recent Trends

The most important requirement in performing a water quality analysis is to have water quality data. In order to adequately evaluate long-term water quality trends, an extensive record of historical water quality data is essential. An abundant record of data will produce the information required to clearly define the changes and trends in the water quality picture over the years. Unfortunately, this source of information is lacking in Puerto Rico.

For the surface waters of the island, it was decided to limit the analysis to the data recently collected as part of the routine monitoring network of surface waters carried on by the U.S. Geological Survey. It was felt that these last two years' worth of data would serve as a good baseline from which to evaluate progress and trends in future 305 (b) Reports.

The general trends noted in the surface waters over the last two years indicate that there have been some improvements in water quality with respect to dissolved oxygen and coliform bacteria. This is especially true for the coliform bacteria since the data indicate a greater-than 70 percent improvement in total coliform concentrations from 1974 to 1975. This improvement is attributed to both the sewering of rural areas and construction of new treatment facilities, as well as to the addition of adequate chlorination facilities at the existing plants. The extent of the problem is still great, however, as 31 of the 55 stations monitored for total coliforms in 1975 are still in contravention of the standard.

The analysis of the quality of the coastal waters of Puerto Rico is based on all the available data. The data collected as part of the routine monitoring network of coastal waters carried out by the Puerto Rico Environmental Quality Board during the last two years will serve as an indicator of current water quality as well as a baseline for future reports. In addition to this data, a summary was made of all existing data prior to 1974. This included all surveys made at various locations around the island during the last ten years. This was done to establish a baseline quality for this report, and it is recommended that in the future, this data be phased out and replaced with the routine monitoring data.

The general trends noted in the dissolved oxygen analysis indicate that in almost all cases where dissolved oxygen data are available from pre-1974 sources, the concentration has improved according to 1974-1976 data for similar locations. It can be seen that the specific increases in coastal water dissolved oxygen are a direct result of the increase in the dissolved oxygen of the river near which the sample was taken.

The existing quality of the coastal waters is good as is evidenced by the fact that of the 40 routine monitoring stations for FY 75 only two showed mean valves for dissolved oxygen at less than the standards.

With respect to coliform bacteria, which is considered to be a more significant parameter in determining the recreational uses of the coastal waters, it can be seen that there is a marked improvement in total coliform concentrations between pre-1974 and current sources.

In terms of existing water quality, it should be noted that there are still coastal waters in violation of the applicable water quality standard, but these violations represent a small percentage of the total stations sampled.

The San Juan beachfront represents a key area in the economic future of Puerto Rico. This high-tourism area has long had water quality problems related to extremely high coliform counts, and currently certain beaches still have warning signs posted. The large percentage of illegal sanitary sewer connections to storm sewers was the chief reason for the degraded quality of the waters in this area.

Corrective measures have been taken, and an analysis comparing the results of the bacteriological surveys of December 1975 and January 1976 with those of a 1974 EPA survey was made. In addition to samples taken along the beach, localized samples were taken around each of the two major outfall pipes in the study area.

This water quality study of Condado Beach indicates that there has been an improvement of the bacteriological quality of the discharges of the ourfall since the EPA survey in 1974. However, there still exist health hazards to those who would use the area as there are geometric means of fecal coliform for morning samples exceeding the 200/100 ml standard.

The Condado Lagoon has shown remarkable improvement in water quality, as was presented in last year's report. Significant decreases in both total and fecal coliform have been observed since 1971. The current quality of the lagoon is still satisfactory and it is being used for recreational purposes. The three stations that are sampled in the lagoon as part of the routine monitoring network re-affirm the fact that conditions have improved since 1975 but sufficient data are not available to draw definite conclusions regarding changes that have occurred since the 1974 surveys.

The results from a report on the water quality in San Juan Bay is presented as a brief analysis of the dissolved oxygen trends in this system. Water quality surveys are available in the system for the summer of 1969, January 1971 and December 1973. It can be seen from these results that there has been no improvement in the dissolved oxygen concentration in the San Juan Bay systems over the years of these studies.

The current waterborne diseases situation in Puerto Rico is relatively unchanged from what was reported last year. All surface waters of Puerto Rico must still be assumed to harbor *Shistosoma mansoni*, the parasite causing the disease Schistosomiasis. Incidence of the disease is about 14 percent islandwide and ranges up to 27 percent in the most heavily afflicted areas.

Water Quality Goals and Control Programs

The situation in Puerto Rico with respect to water quality goals is basically unchanged since last year's report. The fundamental problem facing this end is the presence of the parasitic disease Schistosomiasis. It is felt that the goals of the Water Pollution Control Act are attainable in Puerto Rico but whether or not they can be attained by 1983 is another story. It is felt that after the July 1977 milestone there will be a better overview in this regard.

Costs and Benefits

The municipal needs were determined to be $603 million (1973 dollars) in the 1974 "Needs" survey. This is the cost that was presented in last year's report. In order to update this figure, the total cost estimate presented in the most recent priority list was tabulated to be $959.4 million. This represents the majority of projects scheduled for construction but is not a complete list since there are certain projects for which no cost information has been compiled to date.

At this time there is no information available concerning the costs involved with applying water quality management techniques to industrial or non-point sources of pollution.

The benefits to be derived by providing secondary treatment at regional plants employing long ocean outfalls are still questioned. It seems clear that budgetary considerations will exercise a strong influence on future planning of treatment levels in Puerto Rico.

Non-Point Sources of Pollution

Though no new data have been generated, and very few observations have been carried out in this respect, it seems clear that the non-point pollution situation in Puerto Rico has changed very little since last year. The major non-point sources are attributed to rural populations discharging raw wastes to receiving waters, siltation runoff, pesticide contamination and agricultural runoff.

APPENDIX A
Summary - State of Rhode Island

Complete copies of the State of Rhode Island 305(b) Report can be obtained from the State agency listed below:

Division of Water Pollution Control
Rhode Island Department of Health
State Office Building
Davis Street
Providence, RI 02908

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Introduction

This report seeks to summarize: (a) Existing water quality; (b) effect of point sources of discharge; (c) waters expected to meet water quality criteria for 1977 and 1983, with an analysis of conditions possibly preventing this achievement; and (d) costs of achieving the objectives of PL 92-500. In the discussion of water quality, the basin approach is taken, incorporating basins established for the 303(e) continuing planning process. The report is based on information contained in the water pollution control plans for the seven basins for Rhode Island (Blackstone, Moosup, Moshassuck, Narragansett Bay, Pawcatuck, Pawtuxet, and Woonasquatucket, as shown in Figure I), the 1975/305(b) Report, the 1974 Needs Survey, and 1975 Construction Grant Priority Report. Table I presents a summary by basin of the status of meeting water quality objectives. More detailed information can be found in reports listed in the reference section.

Rhode Island has a combined land and inland water area of 1,058 square miles. It has a salt water shoreline of 419 miles in length. While Rhode Island is the nation's second most densely populated State, 70 percent remains undeveloped. The goal of the State's Statewide Planning Program is to retain, through proper land use planning, an open space at 50 percent of the total land area through 1990.

Rhode Island's economic base has changed significantly from the time the textile industry replaced agriculture in the middle 19th century as the major industry. In recent years, jewelry and machine-tool manufacturing has replaced the textile industry as the major manufacturing industries. In 1971, it was estimated that non-manufacturing employment provided more than three-fifths of the jobs available. From 1965 to 1970, employment in manufacturing declined by 600 jobs while employment in non-manufacturing service industries increased by 25,000 jobs.

Many rural communities have sought to increase their tax base by zoning rural areas for industrial use. Yet a recent survey reported that one-quarter of all industrially-zoned sites in Rhode Island were characterized by unfavorable soil and topographical conditions. One-sixth lacked public water, three-fifths lacked public sewers, and two-thirds lacked rail service. It is our intent through the State land use plan and the issuance of State approvals for treated waste discharges to discourage or prohibit industrial growth in rural areas where public sewers are not available, especially where industries require large amounts of water and would consequently produce large volumes of waste for disposal. Recently established industrial parks, provided with public water and sewerage, are still under-utilized.

Water Quality

In the 305(b) Report for 1975, only those rivers and major tributaries considered to be in an "impacted area" (i.e., waters presently in a downgraded condition or in areas where future growth could have an impact) were considered. However, to be in conformance with the EPA reporting system, where all major tributaries are considered (even in rural areas with water quality now A or B) we have amended our reporting format. Therefore, a direct comparison between 1975 and 1976 305(b) Reports cannot be easily made, except for Narragansett Bay and Moosup River, which have no additions and the Moshassuck and Woonasquatucket Rivers, which show little change with the addition of smaller Class B tributaries. This format then should be taken as setting the baseline for future water quality improvement.

Rhode Island maintains a monitoring program of both major surface waters and waste treatment plants. From Table 1, 64 percent of the major rivers and their tributaries now meet 1983 goals and 92 percent of Narragansett Bay acreage is Class SB (suitable for bathing) or better. Even with the proposed vast expenditure of funds, only 71 percent of the river miles and 96 percent of Narragansett Bay will meet the 1983 goals of swimmable waters. These percentages partly reflect the Health Department's policy of classifying areas around outfalls of even tertiary sewage treatment plants C (SC), unsuitable for swimming, realizing that such treatment works are not accident-proof. The public should bear in mind that these estimates of achievement may themselves be over-optimistic. Conditions affecting these achievements include adequate Federal and State funding adherence to construction schedules, availability of equipment, public acceptance of project costs and adherence with NEPA requirements.

In addition to an extensive surface water quality monitoring program and waste discharge monitoring program, Rhode Island conducts a ground water quality monitoring program of the major aquifers of the State as part of the water supply protection program. Rhode Island's ground waters are of exceptionally high quality and, with the exception of aesthetic problems in areas with naturally occurring iron and manganese concentrations, produce an adequate water supply for many suburban communities. As deep well injection of wastes is not permitted in this State, it is expected that ground water quality will continue to be quite acceptable in quality. An overall review of ground water in Rhode Island (quality, yield) will be considered in the Section 208 project in order to identify existing and potential aquifiers and to develop future management strategy for aquifer protection.

FIGURE 1
RHODE ISLAND RIVER BASINS

- A. Blackstone
- B. Moosup
- C. Moshassuck
- D. Narragansett
- E. Pawcatuck
- F. Pawtuxet
- G. Woonasquatucket

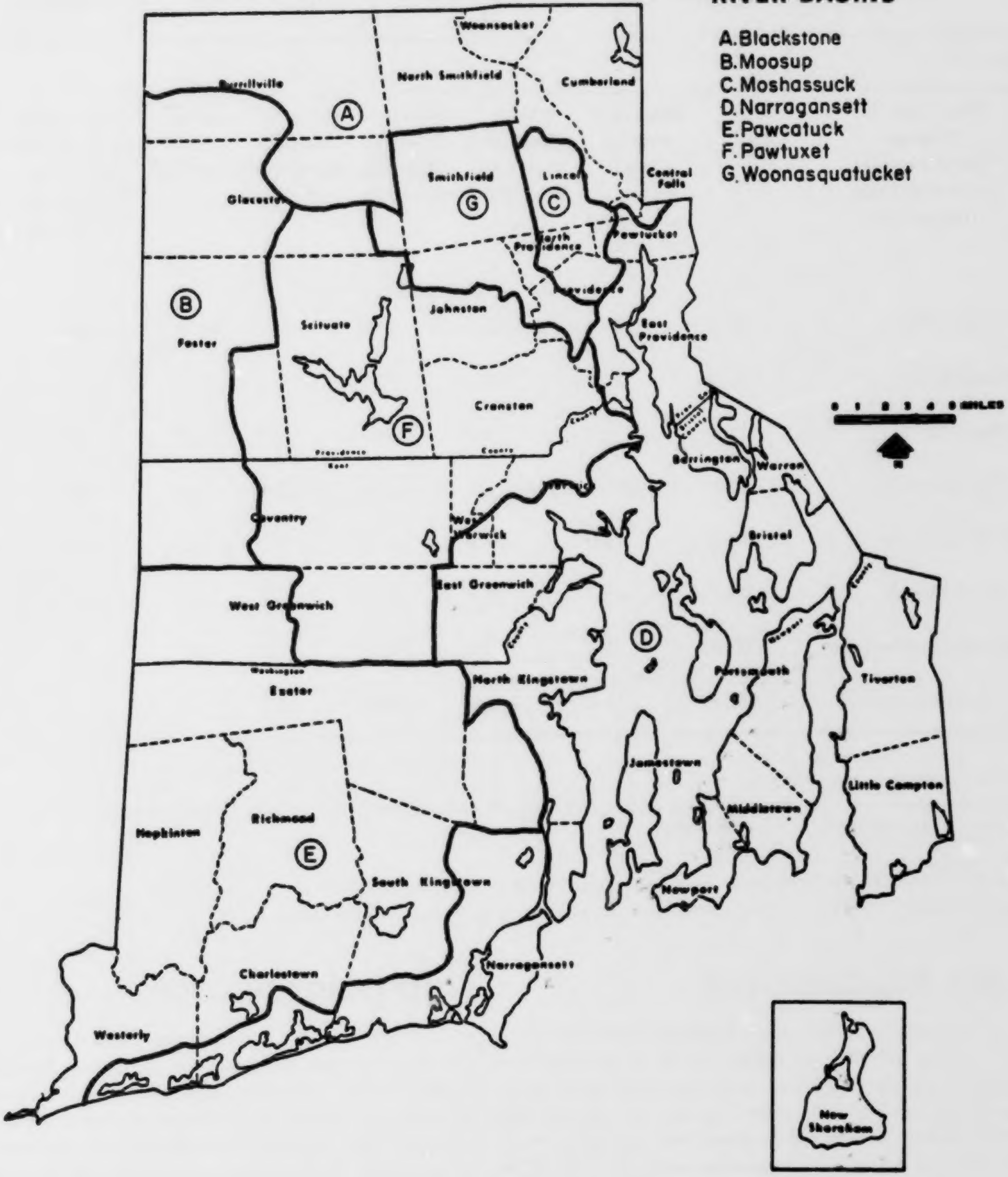
Woonsocket
Burrillville
North Smithfield
Cumberland
A
Smithfield
G
Lincoln
C
Central Falls
Glocester
Pawtucket
North Providence
Providence
B
Foster
Scituate
Johnston
East Providence
Cranston
F
Providence
Kent
County
Barrington
Warren
Warwick
Coventry
West Warwick
Bristol
East Greenwich
West Greenwich
D
Washington
Exeter
North Kingstown
Portsmouth
Tiverton
Jamestown
Middletown
Little Compton
Hopkinton
Richmond
E
South Kingstown
Newport
Charlestown
Narragansett
Westerly
New Shoreham
MILES
N

TABLE 1

STATE OF RHODE ISLAND 305(b) WATER QUALITY INVENTORY SUMMARY – APRIL 1976

1	2	3	4	5	6	7	8	9
River basin or drainage (including main-stem and major tributaries)[a]	Total miles	Miles *now* meeting Class B (fishable/ swimmable) or better	Miles expected to meet Class B by *1983*	Miles *now* meeting State WQ standards	Miles *not* meeting State WQ standards	Water quality problems*	Point-source causes of WQ problems M=Municipal I=Industrial	Non-point source-caused problems 1=major 2=minor 3=N/A
Blackstone River	88.8	47.9	53.7	75.5	13.3	5,6	M,I	2
Moosup River	25.2	25.2	25.2	25.2	0	–	–	–
Moshassuck River	17.4	8.2	9.9	14.1	3.3	5,6	M	1
Narragansett Bay	117,764ac	107,959ac	112,832ac	107,959ac	9,805ac	6	M,I	1
Pawcatuck River	115.0	93.9	102.5	111.0	4.0	5,6	M,I	unknown
Pawtuxet River[b]	59.7	28.3	29.8	56.4	3.3	5,6	M,I	2
Woonasquatucket River	22.6	7.9	12.8	19.8	2.8	5,6	M	1
Total river miles	328.7	211.4	233.9	302.0	26.7			

*Column 7—*Water Quality Problems:*
1. Harmful substances; 2. Physical modification (suspended solids, temperature, etc.); 3. Eutrophication potential; 4. Salinity, acidity, alkalinity; 5. Oxygen depletion; 6. High coliform.

[a] Does not include Ten Mile River Basin. See Massachusetts River Basin Plan Reports.

[b] Pawtuxet River – Does not include Flat River Reservoir and tributaries thereto (Existing Class A and B).

Lake Management

Eutrophication in public lakes and ponds in the State are a minor problem in Rhode Island. Those problems occurring are associated with discharges of treated wastewaters. Compliance with permits issued under the NPDES permit system is expected to abate these problems. Problems of an aesthetic nature are expected to continue in the many privately-owned, man-made ponds in the State. Due to development along the shores and tributaries to these ponds with the associated use of lawn fertilizers and individual sewage disposal systems, nutrients will continue to leach into the ponds. Excessive pond weed growth is presently being attacked by physical removal of the weeds. A comprehensive management program for privately-controlled ponds is yet to be developed.

Non-point Sources

The problem of non-point sources of pollution will be considered in separate inputs into the Section 208 planning process. For the next two years, emphasis will be placed on quantification of non-point source problems, while major emphasis will be placed on abatement of pollution from point sources. National water pollution abatement strategy calls for non-point pollution correction in Phase II (1978-1983), and it is expected that implementation of needed controls will take place during that time period.

The following tasks have been established as part of the Section 208 project, relative to non-point sources:

Soils and Surficial Geology	(08066S)
Landfull Sites	(08106S)

Urban Runoff	(08136S)
Erosion and Sedimentation	(08146)
Marinas	(08156S)
Individual Subsurface Disposal Systems	(08116S)

Achievement of 1983 Goals

The achievement of water quality criteria adopted in 1973 by the year 1978 is dependent upon (a) availability of both Federal and State construction grant funds and (b) early implementation of projects, (c) procedural impoundment, and (d) NEPA provisions which delay pollution abatement projects. To date, both funds and progress in implementation have been deficient. Procedural impoundments have delayed exigent projects. It is expected that not all waters will meet the established goals set for 1978.

Lack of Federal and State funds have been complemented by a delay through complicated new regulations and citizen use of the National Environmental Protection Act of 1969 (NEPA) as a means of delaying projects. Construction of needed sewage treatment works to abate pollution brings as its consequences to the community increased taxes and increased growth. Persons fearful of these two consequences have found it possible to delay projects by pressuring EPA to rescind earlier negative declarations for the need of impact statements and to begin studies anew, even as late as the day of awarding construction contracts (Block Island). Thus, where "frivolous and harassing legal action" is guarded against in PL 92-500, NEPA provides an opportunity for the very same action under the guise of considering "all aspects of environmental impact," regardless of the lack of need for a prolonged study. It is our opinion that growth should be controlled by zoning what has been adopted in most communities rather than controlling utility expansion. By delaying projects in a period of skyrocketing construction costs, the project soon exceeds the funds appropriated and the project is stalled until additional financing can be found.

On 12 January 1976, the State of Rhode Island responded to the Staff Draft Report on Impacts of PL 92-500, prepared by the National Commission on Water Quality. The draft report concluded that nationwide the economic impact of PL 92-500 on industry would be minimal, affecting only "marginal" industries and businesses. However, by using information developed by Rhode Island's Department of Economic Development, it was pointed out that much of the industry in Rhode Island met the definition of marginal industry and the resulting job loss due to plant closings which could not meet the goals of the EPA program would be devastating to Rhode Island.

Table 2 presents a summary of the estimated costs in meeting the goals of PL 92-500 in Rhode Island. It is obvious that the funds appropriated by the Federal government, at present rates, can in no way meet the 75 percent Federal share of the cost, even where correction of ruban runoff problems (Category VI) is not included.

Table 3 presents recently-developed cost estimates for upgrading the lower Pawtuxet River from an "E" classification at its lower reaches to either "D" or "C" by 1983. Discussions are now underway with respective communities and industries concerning upgrading this waterway. The cost estimates serve as examples of the magnitude of expenditures required to achieve even realistic goals. It is becoming apparent that to reach higher water quality, the costs become enormous and the benefits realized are of questionable value when compared to the costs of achieving them.

In the EPA Program Guidance Memorandum-61, dated 16 December 1975, John T. Rhett, Deputy Assistant Administrator for Water Program Operations (WH-546), set forth EPA policy which deemphasized the use of construction grant funds for storm water discharge pollution abatement unless cost effective: "...in many cases the benefits obtained by construction of treatment works for (reducing pollution from separate storm water discharges) will be small compared with the costs and other techniques of control and prevention will be more cost-effective. The policy of the Agency is, therefore, that construction grants shall not be used for construction of treatment works to control pollution from separate discharges of storm water except under unusual conditions where the project clearly has been demonstrated to meet planning requirements and criteria described... for combined sewer overflows."

It is apparent that rethinking of national goals is required, even if an inflationary economy is controlled, to reach objectives in line with resources.

TABLE 2

ESTIMATE OF COSTS FOR MEETING 1983 WATER POLLUTION CONTROL GOALS, RHODE ISLAND (3)–1974

	Millions of 1973 dollars									
Basin	I	II	IIIA	IIIB	IVA	IVB	V	Subtotal	VI	Total
Blackstone River	15.9	–	–	–	37.0	15.1	–	68.0	95.7	163.7
Moshassuck River and Woonasquatucket River	18.74	–	2.37	–	22.95	51.1	46.58	141.60	218.9	360.5
Narragansett Bay	30.8	2.8	0.7	0.5	91.2	46.8	40.4	213.0	308.9	521.9
Pawcatuck River	2.9	0.2	–	–	3.7	2.1	–	8.9	18.7	27.6
Pawtuxet River	–	27.2*	0.4	–	37.7	17.1	0.15	83.1	284.7	367.8
Total	68.3	30.2	3.5	0.5	192.7	133.7	86.9	515.8	927.3	1,443.0

*See Table 3 for latest costs on cleanup of Pawtuxet River.

I=Cost for secondary treatment (BPT).
II=Needed additional treatment (WQL).
IIIA=Infiltration-inflow correction.
IIIB=Replacement or rehabilitation of wastewater collection systems.
IVA=New collector sewer systems.
IVB=New interceptor sewers.
V=Correction of combined sewer overflows.
VI=Treatment and/or control of stormwater.

TABLE 3

CAPITAL AND O & M COSTS FOR SEWAGE TREATMENT FACILITIES FOR THE PAWTUXET RIVER–1976 COSTS ADJUSTED TO ENR 2400 AND RECENT RHODE ISLAND CONSTRUCTION GRANTS

		Treatment required to attain Class "D"*		Treatment required to attain Class "C"**	
Treatment plant	Average Daily Flow MGD	Capital costs	Annual O & M costs	Capital costs	Annual O & M costs
Warwick	5	$ 7,000,000	$ 370,000	$ 8,200,000	$ 410,000
West Warwick	7.5	8,900,000	460,000	10,700,000	520,000
Cranston	23	25,400,000	1,150,000	28,700,000	1,260,000
Total		$41,300,000	$1,980,000	$47,600,000	$2,190,000

*Conventional secondary treatment with increased aeration and settling capacity to provide some nitrification.
**Two-stage biological nitrification.

APPENDIX A
Summary - State of South Carolina

Complete copies of the State of South Carolina 305(b) Report can be obtained from the State agency listed below:

Department of Health and Environmental Control
J. Marion Sims Building
1600 Bull St.
Columbia, SC 29201

Introduction

South Carolina is blessed with an abundance of fresh water from the eastern slopes of the Appalachian Mountains to the Atlantic Ocean. It is further blessed with an abundance of coastline with a wide costal plain accompanied by ecologically sensitive marshland. It has been the policy of the State of South Carolina to protect these resources for the benefit of the people of South Carolina and the nation.

The South Carolina Department of Health and Environmental Control (DHEC) has classified streams in the northwestern portion of the State according to the highest fresh water classification, Class AA, to protect these waters for trout survival. All of the major lakes and reservoirs have been classified Class A to protect these waters for recreational use. Many of the streams in the State also are classified Class A for recreation. All of the remaining fresh water streams have been classified for multipurpose use, Class B, requiring quality suitable for domestic water supplies after treatment. Those areas along the coast suitable for shellfish have been classified in the highest salt water classification, Class SA, designed to protect those waters for shellfish gathering. The remaining coastal waters are classified, Class SB and Class SC, for multipurpose use.

One of the goals of the Federal Water Pollution Control Act Amendments of 1972 is "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983; (Section 101 (a) (2)). The State streams classified as outlined above compares favorably with the National goals. Assuming adequate Federal funding, timely guidelines by the U.S. Environmental Protection Agency, and co-implementation of the Act by the U.S. Environmental Protection Agency and the State, water quality to meet the stated goals should be realized. Data presented in Chapter I of the report will address the State's current water quality level with regard to this 1983 goal, "swimmable, fishable" waters. This analysis is based upon the State's Class A and Class SA standards.

At the time of this report, South Carolina is reviewing its Water Quality Standards. Any revisions that come as a result of the review process should bring the State's water quality standards closer to the 1983 goal. The review is tentatively projected to be complete by the end of 1976.

This report, designed to inform the U.S. Congress and the public in general, will at times address subjects on a statewide basis and at other times will address subjects on a basinwide basis. The State of South Carolina is presently developing Basin Plans [Section 303(e) FWPCAA 72]. There are four basins in the State; the Santee-Cooper Basin, the Savannah Basin, the Edisto-Combahee Basin, and the Pee Dee Basin. Completion of these Basin Plans will provide a detailed analysis of each of these four basins sub-divided into sub-basins. Basin Plans analyze a variety of subjects such as water quality, costs of providing adequate wastewater treatment, population, non-point source pollution, the degree of treatment necessary to maintain water quality, and others. These Basin Plans, however, have not been completed. Of the four basins, the Santee-Cooper Basin Plan and Edisto-Combahee Basin Plan are complete. The water quality assessment portion of the Savannah and Pee Dee Basin Plans, have been completed during September, 1975, provides water quality information for those basins. Basin analyses are presented in Chapter I of the report.

Summary

Current Water Quality

The conditions of the waters of the State of South Carolina were reviewed using a combination of biological data and stream water quality data. Generally, the waters were of good to moderately good quality, in most cases meeting the present standards. It was seen that currently 75 percent of the State's waters meet the "swimmable, fishable" goal. An examination by basin of the "swimmable, fishable" goal showed the percentages of waters meeting the goal ranged from 87 percent to 62 percent.

Control Program

Various State programs cover a wide range of activities in pollution control and management. Construction grant projects for municipal facilities are actively being processed without compromising their quality. Facilities Plans (Section 201 of PL 92-500) have been approved for six metropolitan areas. In the field of industrial control, 1975 was a metamorphosis year with emphasis shifting from NPDES permit issuance to permit enforcement. State construction permit issuance increased, reflecting the up grading of treatment plants and the effectiveness of the NPDES permits. It is projected that all NPDES permits will be issued by the end of 1976.

Under Section 401 (PL 92-500), a total of 569 State Water Quality Certifications were issued by the DHEC during 1974-75 to applicants for Federal permits or licenses.

Section 208 Areawide Planning continued with the approval of their work plans projected for late April of 1976. A brief description of each Section 208 area is included. An analysis of the Fiscal Year 1976 Program Plan for South Carolina showed that many major dischargers are currently meeting 1977 standards.

Special programs such as oil spill prevention and fish kill investigation are all contributing to the control of potential pollution problems. Shellfish monitoring along South Carolina's coast checks areas which are safe for shellfishing and prohibits the taking of shellfish from areas potentially hazardous to public health.

Costs and Benefits

Costs given were taken from the 1974 "Needs Survey". These costs were broken into five categories and estimates of each were made. No updates of the 1974 survey have been made.

The benefits of water pollution control were discussed very generally. Statewide, many programs are too recent to show definite water quality benefits.

Non-point Sources

Because of their very nature, non-point sources have not had the recognition, attention, or evaluation that point sources have received. In the Santee-Cooper basin, non-point problems were prevalent around urban areas, and to some degree throughout the basin. The Edisto basin also showed problems prevalent near urban areas and some degree basinwide. Non-point sources were not widespread in the Savannah basin, being mostly confined to urban areas. In the Pee Dee basin the more severe and numerous problems occurred around urban areas and less severe problems in rural areas. Within these problem areas in each basin, the DHEC will conduct surveys to locate and identify the type and volume of the non-point source effluents.

APPENDIX A
Summary - State of Tennessee

Complete copies of the State of Tennessee 305(b) Report can be obtained from the State agency listed below:

Tennessee Division of Water Quality
Control
Department of Public Health
621 Cordell Hull Building
Nashville, TN 37219

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Introduction

The organization of this report is based on the 13 hydrologic basins as described in Tennessee's Continuing Planning Process pursuant to Section 303(e) of the Federal Water Pollution Control Act. These are described again in this report. Unfortunately, not all of the 303(e) basin plans have been completed, but all are underway and all available information is used.

An overview of water pollution problems in Tennessee indicates that, in general, the quality of waters in the State is very good. There are no gross pollution problems encompassing lengthy segments of streams. Rather, most of the pollution is confined to short segments of streams and is the result of one or two point source discharges. The main areas which suffer pollution from multiple dischargers are the Chattanooga area, the Upper Holston River in the Kingsport area and to some extent, the areas associated with Nashville, Knoxville and Memphis.

Point source pollution in Tennessee results from the discharge of domestic sewage from such sources as municipalities, schools, hospitals and shopping centers and from the discharge of industrial waste from such sources as chemical plants, paper mills and metal plating companies.

Pollution resulting from agricultural activities is not believed to be a major problem. It is currently being investigated through basin planning efforts and through special monitoring related to feedlots. Agricultural activities which are known to affect water quality in Tennessee are confined feeding operations, plowing areas subject to erosion, use of chemicals (i.e., fertilizers, herbicides and pesticides), some watershed projects and some drainage projects.

There is a considerable amount of surface mining activity in Tennessee, some of which has a very detrimental affect on water quality. Most of these problem areas are located in the Upper Cumberland River Basin and in the Clinch River Basin and are the result of surface mining for coal in mountainous areas. Because of the energy problems which currently exist, there is likely to be an increase in strip mining for coal with an ensuing increase in water quality problems and in environmental degradation. Strong laws and an expanded program in this area will be necessary to prevent pollution and maintain water quality. Another energy related matter that needs careful and increasing attention is that of nuclear power plants. Water quality may be threatened by both thermal discharges and accidental loss of radioactive materials. State regulatory agencies, as yet, have been given little control or credited with having much expertise relative to this rapidly expanding industry.

Eutrophication problems are not extensive but some problems do exist in reservoirs receiving a heavy load of nutrients, when the reservoir has a long retention time.

A mixture of point source pollution and non-point pollution problems often occur in and around heavily populated areas as a result of spills followed by storm run-off, improperly designated or placed septic tank systems and construction projects.

Although the 305(b) Report is expected to deal mostly with the problems, some positive points should be emphasized. Tennessee is blessed with an abundance of natural resources ranging from its mountains, forests and fast flowing streams in the east to its fertile croplands and low-lying wetlands in the west. Tennesseans have long valued clean water and partly as a result of superior water quality, there has developed a large recreation-based industry in Tennessee. One objective of the recreation industry is to protect and maintain high water quality. The industry has played a very important part in supporting the Division of Water Quality Control during its 30 years of existence and has aided in getting enacted Tennessee's present Water Quality Control Act which was signed into Law in 1971 and is undoubtedly one of the strongest in the United States.

The Tennessee Act, in conjunction iwht the Federal Water Pollution Control Act, should ensure the maintenance and improvement of water quality. Unfortunately, the implementation of the Federal Act has had a negative impact on the State program by increasing paperwork, complicating interagency decision-making, and causing needless duplication of effort. Some unnecessary delays have been experienced, especially with regard to the federally funded municipal construction grant program. It is hoped and expected that this negative impact is temporary and that the State and Federal Acts will soon complement each other.

One obvious problem in the preparation of the 305 (b) Report is the requirement that it be prepared and submitted on an annual basis. However, updates and revisions to the basin plans are required on two-year intervals. Although basin planning is an on-going process, substantial changes in the status of particular basin plans may not be obvious on an annual basis, and therefore may reflect little change when viewed in this report.

Summary

Basins are summarized in the same sequence as corresponds to their priority rank which was determined through Tennessee's basin ranking system.

Lower Tennessee

Within the Lower Tennessee River basin lies the City of Chattanooga, one of the four major metropolitan areas in Tennessee. Due to high population density and industrial development, many water quality problems exist in this area of the basin. There are also several other areas of either high population or industrial development in the basin which have significant water quality degradation. Only about a third of the municipal treatment systems in the basin are meeting effluent standards.

There are currently 48 segments designated in the basin. In 14 segments, standards are being met. In 14 segments, there are no specific delaying factors to prevent meeting the 1977 goal. In 15 segments, delaying factors exist but the 1983 goal could possibly be met. In 5 segments, it is believed to be impossible to meet the 1983 goal due to the complexity of the pollution problems (see Table 1).

Holston

Within the Holston basin is the Tri-Cities area of Kingsport, Johnson City, and Bristol which is a major industrial area with many complex pollution problems. The most extensive water quality degradation in the basin exists in the immediate area of Kingsport. Stream segments classified for fish and aquatic life in this area frequently experience conditions of low dissolved oxygen, extremes in pH, excessive concentrations of toxic compounds, high concentrations of solids, and extreme temperature variation.

Of the 21 municipal treatment systems in the basin, 8 are presently not meeting secondary treatment standards, and 4 have only primary treatment.

There are currently 72 segments designated in the basin. In 24 segments, standards are being met. In 6 segments, there are no specific delaying factors to prevent meeting the 1977 goal. In 36 segments, delaying factors exist but the 1983 goal could possibly be met. In 6 segments, it is probably impossible to meet the 1983 goal due to the complexity of the problems.

Lower Cumberland

Within the Lower Cumberland basin lies the Nashville metropolitan area. The city is located on the main stem of the Cumberland River, but most of the pollution problems are associated with tributaries in the densely populated and heavily industrialized sectors rather than in the main stem of the river.

The most extensive water quality degradation in this basin is in the Stones River below J. Percy Priest Dam and

TABLE 1

SUMMARY – GOALS OF THE ACT

Basin	No. segments meeting standards	1977 goal possible	1983 goal possible	1983 goal cannot be met	Total segments designated
Lower Tennessee	14	14	15	5	48
Holston	24	6	36	6	72
Lower Cumberland	64	1	8	8	81
Clinch	30	1	30	–	61
Upper Tennessee	20	5	13	5	43
Memphis area	10	2	28	7	47
French Broad	34	5	14	–	53
Duck	20	5	12	–	37
Obion-Forked Deer	10	1	46	–	57
Tenn. River-Western Valley	17	–	17	–	34
Upper Cumberland	33	1	20	7	61
Elk	19	4	7	–	30
Hatchie	5	1	12	–	18

in the Stones River tributaries near the City of Murfreesboro. Violations of water quality standards in this area have included the parameters of dissolved oxygen, solids, fecal coliform, temperature and toxic materials.

The Harpeth River and its tributaries have some water quality problems, but overall, some of the highest water quality in the basin is found here. Great effort will be necessary to protect the waters of the Harpeth because of the rapidly increasing population within this area.

Clinch

There are relatively few industrial and municipal sources of pollution within this basin. The most significant are associated with the Cities of Harriman, Oak Ridge, Crossville and Kingston, and the industries of Mead Corporation and the Atomic Energy Commission. The greatest cause of degradation to water quality in the watershed is related to surface mining activity. Tennessee has a surface mining law which should prevent, to some extent, further degradation by currently operating mines. Existing areas that were stripped and not properly reclaimed will continue to cause problems for many years unless a program is initiated to reclaim the damaged areas. There is presently no indication that the State will undertake such a program. There is much high quality water remaining in this basin, and the need for its preservation is great.

Upper Tennessee

Within the Upper Tennessee basin lies the City of Knoxville, one of the four major metropolitan areas in Tennessee. Due to the high population density and many major industries, there are many water quality problems in the Knoxville area. Outside of this area, water quality in the basin is generally good. The most significant problems related to municipalities are associated with the Cities of Knoxville, Spring City, Sweetwater, Alcoa, Maryville, Madisonville and Rockwood, while the most significant problems related to industries are associated with dyeing and metal processing.

The main stem of the Tennessee River is considered to be in violation of dissolved oxygen standards from time to time throughout the summer months for some 122 stream miles. This problem is not solely due to discharges; it is believed to be the result of Tennessee Valley Authority impoundments and the water release practices of the agency.

There are 17 municipal systems in the basin. Of these, 5 systems are presently not meeting the secondary treatment requirements, and 2 systems have only primary treatment. Of the total systems, 12 need to upgrade treatment to secondary or tertiary to meet water quality standards.

Memphis Area

The Memphis Area basin has the largest population density of any basin in Tennessee. This causes no great water quality problem to the Mississippi River, the basin's major stream, but does cause intense water quality problems within tributary streams that flow through the City of Memphis. The Loosahatchie River, Wolf River, Nonconnah Creek and their tributaries are polluted by sewage and industrial waste near the City of Memphis. Many of these streams have had recurring fish kills. Two large treatment plants are under construction and several large interceptors are under construction or completed. Once completed, these projects should improve water quality immensely in this basin. Due to the complexity of the problems in this area, an area-wide management plan (PL 92-500, Section 208) is being prepared and will be necessary to reveal the solutions to many non-point source and land use problems.

French Broad

This basin does not contain any complex problem areas but does contain many problems as a result of single point sources. Three major streams in the basin do not meet stream standards due to polluted stream flow from North Carolina, these being the French Broad, the Nolichucky, and the Pigeon. This interestate problem has existed for many years and it is hoped that the Federal Water Pollution Control Act (PL 92-500) will bring about abatement in as short a time as possible.

Municipalities currently causing pollution in this basin include Newport, Gatlinburg, Pigeon Forge, Jonesboro and Erwin. There are 41 industries which have discharges while only 15 are considered as having adequate treatment. Many different types of industry are represented, some with wastewater very difficult to treat. In the Gatlinburg-Great Smoky Mountain National Park area, sedimentation has been a problem as a result of construction of housing developments on steep mountain slopes. This has damaged some small streams where the need for preservation of pure water is very great. Tennessee does not presently have adequate means to control this kind of non-point source.

Duck River

In general, the Duck River basin has good water quality and most of the streams are classified and support aquatic life and recreation. Localized water quality problems do exist in the basin. Seven municipalities and seven industries have inadequate treatment and are impairing stream usage.

Most of the industrial waste discharges are associated with the phosphate industry. This industry accounts for 87 percent of the total industrial wastewater discharged in the basin. Problems associated with surface mining include ore processing and production of phosphate chemicals. Many of the problems have occurred because of accidental spills; on several occasions these have caused fish kills. These accidents are preventable and precautionary measures are now being required by the State.

Orbion – Forked Deer

Since most of the land in this basin is devoted to agriculture, most water quality problems are related either directly or indirectly to agriculture. Pollution problems are caused by non-point source runoff from cropland of silt, fertilizers, pesticides and herbicides.

A major cause of water quality degradation in the basin is drainage projects, drainage of natural wetlands, and channelization of streams. Most of the agriculturally related problems are tied closely to Federal programs or are under Federal controls. The State does not now have adequate means to deal with water quality degradation caused by agriculture.

Many of the municipalities in the basin use the lagoon method of treatment for wastewater. This method will not, in most cases, meet the requirements of PL 92-500. However, it may, with certain modifications, be the best method of treatment in this part of Tennessee.

Tennessee River/Western Valley

The Western Valley of the Tennessee River divides the flat agricultural land of West Tennessee and the more hilly lands of Middle Tennessee. Tributaries to the west are thus affected more by farming activity while those to the east are more affected by industry.

Probably the most significant problem in the basin is the remaining high concentration of mercury in the mainstem of the river. Although the source of the mercury, which was discharged by the Diamond Shamrock Company in Alabama, was detected and stopped in 1970, the metal is still found at high levels in sediments and in fish flesh. Mercury levels are closely monitored by the State and the Tennessee Valley Authority, but no estimate can be made regarding how long levels will remain high.

Most of the basin waters meet the goal of fishable, swimmable waters specified by the Federal Act.

Upper Cumberland

This basin lies in the Cumberland Mountain region and has few problems related to dense population or industry. Water quality is excellent except in those areas which have been strip mined for coal. Surface mining for coal has caused many problems including degraded water quality. Tennessee now has an Act which provides for regulation of surface mining and has intensified regulatory activity in this field. It should be noted, however, that past mining, where reclamation was not adequate, continues to cause pollution in the waters of the basin and no method currently exists to deal with this situation. In fact, most of the early mining companies were small and many no longer exist; also, many of the original land owners are gone, leaving State or Federal regulatory agencies with the problem of placing responsibility for reclamation and pollution abatement.

Elk River

In general, the water quality of this basin is very good. Most of the streams are classified and used for all reasonable uses, i.e., they meet the goals of fishable, swimmable waters. Several localized problems do exist that are causing impairment of stream uses in the tributaries involved. Three municipalities and one industry are creating pollution problems through inadequately treated wastewater discharges.

There is relatively little industrialization in this basin. The largest industrial discharger, by volume of waste, is the Arnold Engineering Development Center, a Federal facility which accounts for approximately 94 percent of the total industrial wastewater discharged in the basin.

Hatchie River

The Hatchie basin lies in rural West Tennessee and has, by far, the highest quality water of the West Tennessee basins. The existing problems are about the same as those described for the Obion-Forked Deer, i.e., they relate primarily to agriculture.

The Hatchie River has been designated as a State scenic river and preservation of its pure waters is a high priority. Except for high levels of silt, most of the waters in the basin meet the goals of fishable, swimmable waters. The State has not classified most of the streams for swimming because of the muddy character of the water.

APPENDIX A
Summary - State of Texas

Complete copies of the State of Texas 305(b) Report can be obtained from the State agency listed below:

Texas Water Quality Board
Administrative Operations Division
P.O. Box 13246, Capitol Station
Austin, TX 78711

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The State of Texas did not provide a short summary to its 305(b) Report, but provided the following data summary sheet.

Statewide Summary Sheet

1. Total number of dischargers in State – 3,817.
    a. Total municipal dischargers – 1,922.
    b. Total industrial dischargers – 1,452.
    c. Other dischargers – 443.
2. Number of permanent instream sampling stations – 618*.
3. Projected cost of municipal facility – $2,982,150,328.
4. Projected cost of industrial facility – $3,315,434,206.
5. Projected total cost to meet 1983 goal (less non-point sources – $6,297,584, 534.
6. Gross comparison of water quality trends:

	1973 Standards**		1976 Standards***	
Water use deemed suitable	No. of segments	%	No. of segments	%
Contact recreation	183	63.5	221	74.4
Non-contact recreation	280	97.2	295	99.3
Propagation of fish and wildlife	282	97.9	291	98
Domestic raw water supply	161	55.9	173	58.2

*Sampling stations for other waters not located within a specific segment equals 116.

**1973 standards based on 288 segments.

***1976 standards based on 297 segments.

APPENDIX A

Summary - Trust Territory of The Pacific Islands

Complete copies of the Trust Territory of the Pacific Islands 305 (b) Report can be obtained from the State agency listed below:

Division of Environmental Health
Department of Health Services
Trust Territory of the Pacific Islands
Saipan, Mariana Islands 96950

Summary

Water pollution from municipal sources results in water quality below existing Trust Territory standards in most district centers in the Trust Territory and remains a major public health problem.

Parasitic protozoans and worms, hepatitis and a variety of waterborne or water-associated bacterial and viral diseases are endemic to the eastern and western districts of the Trust Territory and frequently reach epidemic proportions.

Construction of wastewater collection and/or treatment facilities remains a high-priority program in all district centers and in certain population dense sub-district centers. Districts with completed wastewater treatment or sewer systems face the problem of funding for individual house hookups and necessary secondary collection lines. This ongoing problem has been partially resolved by recent notification from the U.S. Department of Housing and Urban Development (HUD) that the Trust Territory has qualified for Block Grants under Title I of the Community Development Act of 1974 to finance house-sewer connections on a 100-percent grant basis. Additionally, the Farmers Home Administration has indicated that the Trust Territory qualifies for low interest (1 percent), 10-year loans, available for construction of flush toilets and other sanitary facilities. These programs will provide valuable assistance to low-income families who cannot afford the outright purchase of proper sanitary facilities or sewer hookups.

Although these Federal programs will provide needed assistance in reducing pollution from municipal sources, it is unlikely that most district center areas will achieve the 1983 goals of the Act. Urbanization, rapid population growth, substandard housing, improper solid waste management practices, wastewater treatment plant operation and maintenance problems and non-point sources will preclude the Trust Territory from the "fishable" and "swimmable" goals of the Act.

Bacteriological water quality data based upon monthly sampling at defined lagoon monitoring stations has indicated relatively constant patterns of nearshore pollution in several district centers. These patterns have, with few exceptions, remained unchanged for the past three years.

Baseline water current and underwater ecological surveys were conducted during the past year at proposed outfall sites in three districts and in one sub-district. These surveys have provided sound guidelines as to optimum placement of outfalls and diffusers, with respect to public health and ecological concerns, and will also provide a data base for evaluating the impact of treated wastewater effluent in tropical marine environments.

Operation and maintenance problems at existing wastewater treatment plants, lack of trained treatment plant operators and overall cost-effectiveness dictate the need for a close examination of alternative treatment methods in line with available resources and technology and conforming to the definition of "best practicable waste treatment technology".

Research is needed on low-cost oxidation and stabilization ponds which may offer an efficient and cost-effective means of wastewater treatment adaptable to many small islands and rural population centers. The Territory's equatorial solar radiation, lack of seasonal climatic extremes, temperatures of about 82°F, and the prevailing tradewinds should *a priori* be ideal for proper waste stabilization in simple, non-mechanical oxidation or stabilization ponds. Provided with sufficient research and proper management guidelines, coastal mangrove swamps, which are abundant around most high islands, could serve as natural sewage stabilization basins. The current scientific literature indicates that mangrove swamps may well be effective treatment areas and nutrient sinks for tropical coastal environments.

Oil population incidents in district center ports continued on the decline for the past year with few significant spills reported. Offshore oil spills or bilge pumping continue to occur by vessels of unknown registry. Collectively, these events have reduced the recreational value and jeopardized valuable marine habitat areas on the islands of Saipan, Tinian and Rota. The United States Coast Guard, Guam, does not have a sufficient surveillance or response capability to reduce the frequency of these offshore events.

Hazardous chemical problems still center in the Truk Atoll where numerous sunken World War II Japanese cargo vessels continue to release toxic explosive ordnance chemicals into lagoon waters (in addition to aviation gasoline and fuel oil). In November 1975, a vessel containing 500-700 tons of ordnance was located within one-half mile of a major population center. Despite attention given to this potential pollution and public safety problem in international scientific journals, trade magazines and other periodicals, no support has yet been demonstrated to undertake a study and determination of the ultimate disposition of these hazardous cargoes.

Recently promulgated "Regulations to Control Earthmoving and Sedimentation in the TTPI" combined with the recent revision and expansion of Section 404 of the FWPCA under the Corps of Engineers have already made significant progress in reducing pollution from one landfill dump which is believed to be a significant non-point source. Unfortunately, growing program administration requirements did not permit a survey and estimate of non-point source problems on a district-wide basis. Non-point sources, primarily silt and sediments resulting from urban runoff and poor construction practices, continue to degrade water quality and reduce the recreational, ecological and fishery value of many estuaries, reefs and ocean waters. Non-point source surveys will be the major effort of the district staff during FY 1977.

APPENDIX A
Summary - State of Utah

Complete copies of the State of Utah 305(b) Report can be obtained from the State agency listed below:

Bureau of Water Quality
Environmental Health Services Branch
Division of Health
Department of Social Services
221 State Capitol
Salt Lake City, UT 84114

Description of the Water Quality of all Navigable Waters in the State of Utah

The Great Salt Lake

The Great Salt Lake must be included in this description since it is a navigable water. However, because of the high mineral content of the waters, it is somewhat difficult to talk about water quality in the usual sense, because the average alkalinity of the water ranges up to 280,000 – 290,000 parts-per-million and higher.

Even though the harsh environment restricts the number of kinds of organisms which exist in the lake, these few kinds of organisms can reproduce in large numbers. As an example, the algae *Dunaliella* alone may exceed 300 million organisms/liter. The Great Salt Lake, therefore, must be considered biologically as a highly productive body of water.

Reservoirs and Lakes

The inventory of Utah lakes was published in Utah's 1975 Section 305(b) Report. The data on these lakes were classified according to acres of lakes and reservoirs per drainage basin, and were also broken down into trout and non-trout categories.

It has not been possible, in most instances, to do extensive water quality analyses on Utah's lakes and reservoirs. Several different programs are in effect now which will yield the kind of data necessary to complete the inventory in more detail.

The 1975 Section 305(b) Report pointed out that most reservoirs in the State are eutrophic and many of the high mountain lakes are oligotrophic. Additional data have been difficult to gather for this year's report but increased research activity has been initiated.

Rivers and Streams

An analysis of the streams and rivers in Utah was written in the 1975 Section 305(b) Report for Utah. These data stated that rivers and streams, with few short reach exceptions, which were generally located below major population centers, were meeting 1983 goals. Figure 1 displays the stream stations that are currently exceeding (at least two different occasions) the recommended water quality criteria for either BOD and coliform (total and fecal) or both. Table 1 enumerates that frequency that selected stations exceeded the recommended criteria (Class "C" and Public Water Supply). Dissolved oxygen, pH, BOD, and coliforms were usually sampled monthly. Arsenic, cadmium, fluoride, lead, sulfate, total dissolved solids, and total iron were sampled quarterly.

Analysis of Which Waters Will Meet 1983 Goals

The Utah Division of Health has assigned the great Salt Lake a classification of "S" because of its special properties which do not fit into standard water classifications. While these waters are protected under water pollution control requirements, the parameters of the 1983 goals probably do no apply.

The beneficial uses of the Great Salt Lake are primarily for minerals extraction, industrial usage, and also for recreation. The "S" classification requires protection under Utah law " . . . as class 'A' waters except for specific waste discharges . . . and shall not interfere with existing uses of said water."

Most of the natural lakes in the State are located in high mountainous areas. The quality of these waters is generally good to excellent. These waters are not being extensively sampled and analyzed because of their high quality and because of their generally isolated location; nearly all are expected to meet 1983 goals.

Most of the reservoirs, however, are euthrophic and the determination of whether or not each reservoir will meet 1983 goals must wait for further analysis. Each areawide Section 208 agency is examining the more important reservoirs inside its jurisdiction. These analyses, and many of the interim reports, will be published soon. Even though these data are not available in time for incorporation into this draft, some will be available for inclusion in the 1977 report. The Statewide Section 208 Planning Process will be underway shortly and these outputs will be available for the 305(b) Report in FY77 or later.

Analysis of How the Elimination of Discharges will Provide for the Protection of Fish, Wildlife, Recreation, and 1983 Goal Achievement

Fish and Wildlife

The following analysis will demonstrate how fish and wildlife are affected by present discharges, and will indicate how elimination of these discharges will affect game animals and other forms of wildlife.

Fish in Utah rivers and streams are sometimes affected by poor water quality. The following data are based primarily upon trout fisheries because this group of fish is the primary sport object and because there are more data available for game fish.

FIGURE 1

STATE OF UTAH - STREAM STATIONS THAT EXCEED THE RECOMMENDED WATER QUALITY CRITERIA FOR BOD AND COLIFORM

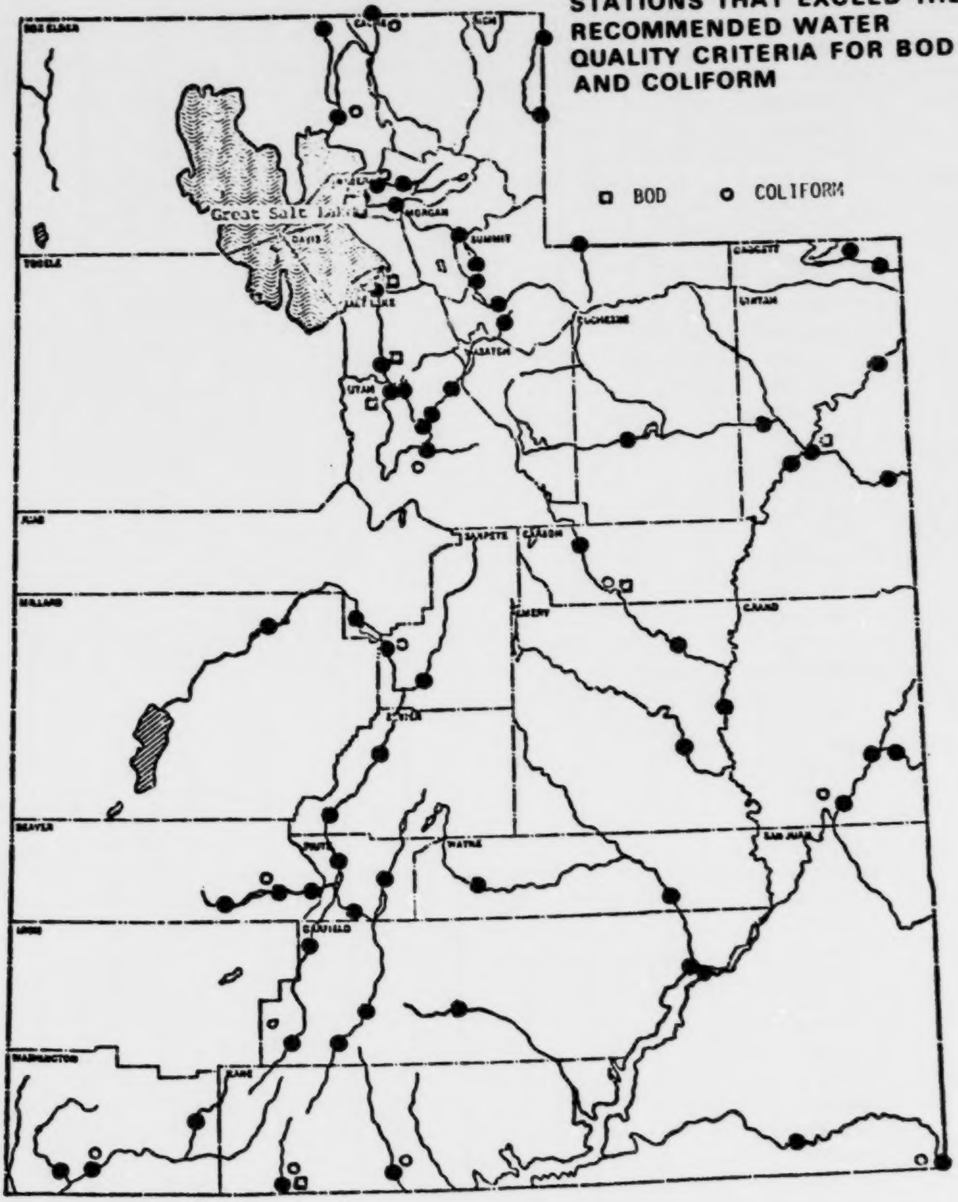
□ BOD
○ COLIFORM
Great Salt Lake
BOX ELDER
CACHE
RICH
WEBER
MORGAN
DAVIS
SUMMIT
TOOELE
SALT LAKE
DAGGETT
UINTAH
DUCHESNE
WASATCH
UTAH
JUAB
SANPETE
CARBON
MILLARD
EMERY
GRAND
SEVIER
BEAVER
PIUTE
WAYNE
SAN JUAN
IRON
GARFIELD
WASHINGTON
KANE

TABLE 1

FREQUENCY OF SELECTED WATERS THAT EXCEEDED RECOMMENDED WATER QUALITY CRITERIA

Waterbody	STORET Number	DO	pH	BOD	As*	Cd*	F*	Pb*	SO_4*	TDS*	T.Fe*	Coliform Total	Coliform Fecal
Jordan River	491-580	2		8						1	1	4	2
	491-502		1	2						1	1	1	
	331-158		5	2						1	1		
Kanab Creek	491-005		1	6					2	2	2	5	3
Malad River	000-034		2		1					1	1		
Ogden River	222-H11		2									2	1
	491-460		2										
Paria River	555-049		1						2	2	2	2	
Price River	555-026		1	1					1	1	1		
	555-118		6										
Provo River	331-553		1										
	331-534		2										
	331-600		2										
Red Creek	555-230		2					1	1	1			
San Juan River	555-055		2					1	1	1	1		
	555-079		2					1	1	1	2		1
San Rafael River	555-030		2						1	1	1		
Santa Clara River	000-214								1	1	1		
Sevier River	494-728		1				1		2	2	1		
	494-110		1						1	1			
	494-694								2	2	2	2	
Sevier River	494-063		5										
	494-141		1		1						1		
Spanish Fork River	331-543		2							1	1	2	1
Spring Creek	331-532		2								1	1	
Strawberry River	555-081		7										
Virgin River	491-001								1	2	2	2	4
	491-012		2								2		
Weber River	491-408			2								1	1
	222-M13		4										
	222-C07		2										
	222-C06		4										
	222-W16		3										
	222-W15		4										
White River	555-009		3	2						1	1	1	
	555-008		3							1	1		
Bear River	000-44B		1							1	1	4	2
	000-09A										1	2	2
	000-006		2	1									
	000-02A		2										
	000-001										1		
Beaver River	494-031		1								2	2	1
Colorado River	555-045		1								1		
	491-304		2						1	1	1	2	1
	555-037		3	1		1			1	1	1		
Dirty Devil River	555-044		2										
	555-350		4			1			1	1	1		
Dolores River	555-097		2	1		1			1	1	1		
Duchesne River	555-302		1							1	1	1	
Escalante River	555-090		4					1			1		
Fremont River	555-070		1					1			2	1	
Green River	491-202		2							1	1		
	555-010		1							1	1		
	555-361		4								1		
	555-310		2							1			

*Based on one or two samples

Fish populations in the Colorado River and lower portions of the Green River are limited because of the high natural salinity and silt loadings. Elimination of discharges in these areas would not appreciably improve the habitat for fish.

The Sevier and Bear Rivers have a situation where salinity and solids, most of which are due to agricultural practices, restrict or destroy fishery potential along their drainages. Both of these streams originate in high pristine watersheds but the fishery potential is destroyed before the terminus of the rivers. Agricultural Best Management Practices may extend the reaches of the fishable waters in these streams but the heavy re-use of these waters will probably always curtail prime fishing habitat in the lower sections of these rivers.

The upper reaches of the Virgin River have relatively good quality water and gamefish are not restricted because of water quality. LaVerkin Springs, a highly saline natural hot spring degrades, the quality of the water below the point which gamefish can tolerate. Furthermore, there are endemic and endangered species of non-game fish in the river that might not be able to compete with game fish if the quality of these reaches were improved.

The lower sections of the Provo and Jordan Rivers are the only reaches of rivers in the State where municipal or industrial discharges are a major factor in determining whether or not fish can survive. The elimination or the substantial reduction of these discharges could be effective in extending the length of fishable waters for only relatively short distances.

Water Quality in Utah is not generally a restricting factor for waterfowl. Most waterfowl management areas in the State are located along the north, east, and southern shores of the Great Salt Lake. The sources of water for these marsh areas are not generally of acceptable quality for fish but support some of the finest waterfowl areas in the Nation. The elimination of discharges will not measurably increase protection for Utah's waterfowl.

Upland and big game are not restricted by the discharges in the State and the elimination of these discharges will not give any increased protection.

Sufficient data are not available on the habitat and the relationship of water quality to non-game wildlife to make statements as to whether or not the elimination of discharges would give a significantly higher level of protection to this segment of the wildlife population.

Recreation In and On the Water

The State of Utah agrees with the desirability of achieving water quality wherever attainable which provides for recreation in and on the water. However, the State Division of Health is generally unable to certify that waters are safe for swimming at all times, for the following reasons:

(a) There is no convenient method of predetermining the influence of bathers on water quality parameters that indicates whether or not a segment is swimmable. Consequently, numerical water quality criteria (such as the present limit of 1,000 coliform/100 ml) are difficult to apply to effectively protect swimming as a sement's designated use;

(b) Swimming in some segments, which have swimmable water quality when bathers are absent, may raise the pathogen levels enough to present health hazards; and

(c) Runoff and wave action caused by storms can temporarily render waters unsafe for swimming because of elevated levels of pollution and turbidity.

Although the Utah State Division of Health has not designated many waters as swimmable, this does not prevent people from swimming in high quality waters at their own discretion.

Partly to be consistent with bordering States, swimming has been designated as a use for three interstate waters: Flaming Gorge Reservoir, Lake Powell, and Bear Lake. These designations can be withdrawn if the waters become unsafe for swimming.

Analysis of How Goals Have or Will be Achieved by the Act

In its 305(b) Report for 1975, the State of Utah expressed its opinion of Public Law 92-500, the Federal Water Pollution Control Act, Amendment of 1972. A summary of that statement follows:

1. As a result of the passage of Utah's Water Pollution Control Act of 1953, impetus was generated for local communities to initiate their own funding and construction of secondary treatment facilities.
2. Utah is close to the goal of having all of the State's sewered population served by secondary (or higher) treatment facilities.
3. The Federal legislative action, particularly that of 1972, has in many ways hindered Utah's municipal treatment program. Federal imposition of requirements upon State efforts are often inappropriate to meet local needs.
4. Federal requirements that are imposed upon the States are not matched by adequate funding to accomplish these requirements.
5. While the Act stipulates that "It is the policy of Congress to recognize, preserve and protect the primary responsibilities of the states," other features of the Act prevent the administrative agencies from implementing that intent.

The Division of Health will soon be able to make specific recommendations as to courses of actions based on its ongoing programs.

1. The areawide Section 208 planning agencies in Utah are now ten months into their two-year planning phase. All of these agencies are doing extensive monitoring and analysis of the water quality problems in their areas. The Section 208 agencies are releasing interim reports. While these documents have not been received by the Division of Health for comment and evaluation at this time, certain tentative data will be available for inclusion in the final copy of the 305(b) Report due at the end of August.
2. The data from the State's primary monitoring network are being incorporated into the new continuous planning process that has been proposed by the new 130-131 regulations. The recommendations will be included in future 305(b) Reports but will not be ready in the report for 1976.
3. Utah is applying for $196,800 to complete the Statewide 208 planning program. The grant application has been forwarded to the EPA. The outputs of this planning process will be reported in future 305(b) Reports.
4. Utah is waiting on the release of the EPA "Clean Lakes" study. While this report is not yet available for inclusion in this draft, it is hoped that it will be received in time for inclusion in the final inventory.

Estimates of Costs and Benefits of the Act

Environmental Impact of the Act

The impact which the Act will have upon the waters of the State of Utah cannot yet be clearly determined. The intent of the Act was to ensure the improved quality of water; however, at least two prerequisites must be achieved before this can be accomplished. The States must be given the authority to implement programs in their area. In addition, the programs which are required by the Federal government must be fully funded. If the above prerequisites are not met, adequate progress toward the goal of the act cannot be achieved.

Social and Economic Costs of Implementing the Act

It is certain that substantial costs will be incurred to implement PL 92-500. It is premature to even attempt to estimate the dollar costs of implementing the Act. The cost of building and maintaining municipal facilities and the supporting sewers, equipment, and attending programs; the cost of controlling and reducing industrial pollution; the cost of locating non-point sources of pollution and implementing best management practices and other remedial measures; the cost of implementing regulatory agencies as well as continued program costs at the local, State, regional, and Federal levels, are impossible to determine at this early stage of the program.

These increased monetary costs will have a severe impact on many marginal industries, and some of the changes in agricultural practices will change rural life styles in many areas.

Social and Economic Benefits from the Act

Until major components of the plan, such as Section 208, have been completed, it will not be possible to estimate the economic benefits of the Act. When these outputs become available, it will be possible to make more accurate projections.

One of the major benefits that will accrue from this Act, however, will be an increased level of public health. As levels of treatment are increased and greater numbers of the population receive adequate waste treatment, the public will certainly benefit. As the higher level of treatment is initiated in various stream reaches the possible contact with pathogens, particularly viruses, will be reduced. This will allow the pursuit of boating and other water-oriented recreational activities except swimming with a greatly reduced probability of contacting disease.

Another projected benefit will possibly be from the non-point evaluation and correction. As non-point sources of pollution are sought out, many will be found to be previously unrecognized point sources. While many of the true non-point sources in Utah are natural sources, many other true non-point sources can be corrected. As Section 208 plans and recommendations are finalized, and as the continuing planning process refines the plans, it will be possible to more accurately determine benefits. Non-point source pollution control will reduce siltation and salinity in the major Utah streams. This will add to the aesthetic appeal of these streams and could, in some instances, improve conditions particularly for boating and fishing.

APPENDIX A

Summary - State of Vermont

Complete copies of the State of Vermont 305(b) Report can be obtained from the State agency listed below:

Department of Water Resources
Agency of Environmental Conservation
State Office Building
Montpelier, VT 05602

Introduction

Vermont's pollution control problems are significantly different from those of the major urban areas of the United States. Low-density population centers and the absence of heavy industrialization has kept the concentration of contaminants in Vermont waters low. This leaves Vermont in a position to maintain or achieve very high water quality standards in the majority of its waters. This relationship of low concentration of contaminants and high water quality objective requires somewhat nonconventional attainment methods. Vermont is continually developing abatement methodologies using approaches consistent with Federal regulations but particularly applicable to the unique situation in which the State finds itself.

1975 Overview of Problems and Progress in the State Water Pollution Control Program

Essentially, all Vermont communities capable of achieving water pollution abatement by the municipal approach are substantially along in the engineering planning process of developing preliminary/final plans and specifications for the needed wastewater treatment facilities. Untreated discharges from small widely scattered municipalities, a number of small industries, and from isolated individual homes in remote areas still require corrective action.

Table 1 summarizes the status of the municipal wastewater pollution control facilities operating at the end of calendar year 1975. These facilities currently serve approximately 80 percent of the sewerable population of the State.

To obtain the high water quality objectives desired by the citizens of Vermont by eliminating the remaining pollution sources created by municipalities, construction of approximately 60 small municipal sewer systems and/or treatment facilities will be necessary together with the upgrading of 36 existing facilities. These new facilities are expected to cost in excess of $125 million. The soil conditions, geographic configuration, and remoteness of the majority of these remaining small communities precludes the regional concepts of wastewater treatment and thus derive the benefits of the economy of scale. These remote, substantially residential communities with their very limited tax base, must bear an extremely high cost for pollution abatement. It is an essential factor in Vermont's pollution control program that the cost of pollution abatement be equalized so that these remote communities can afford the ever-increasing cost for pollution control facilities.

Vermont intends to continue to construct wastewater treatment facilities as rapidly as funding and the development of planning required to meet Federal regulations will permit. Priority for constructing and upgrading facilities still places emphasis on those facilities that will place the maximum amount of water into full compliance with water quality standards, with equal priority being given to those discharges affecting standing bodies of water. First priority will still be given to pollution sources discharging to standing bodies of water and to upstream sources necessary to close gaps in drainage basin water quality attainment programs.

TABLE 1

SUMMARY OF MUNICIPAL WASTEWATER POLLUTION CONTROL FACILITIES–1975

Number of operating facilities	67
Number of facilities discharging	65
Number of facilities not discharging (offstream)	2
Number of primary facilities discharging	22
Number of secondary facilities discharging	43
Number of major* primary facilities discharging	14
Number of minor** primary facilities discharging	7
Number of minor primary facilities not discharging	1
Number of major secondary facilities discharging	26
Number of minor secondary facilities discharging	16
Number of major secondary facilities not discharging	1

* *Major municipal wastewater pollution control facilities* are those facilities with average daily flows in excess of two hundred fifty thousand gallons (250,000).

***Minor municipal wastewater pollution control facilities* are those facilities with average daily flow less than two hundred fifty thousand gallons (250,000).

An update of Vermont's 1974 Facilities Needs Survey has not been included as a part of this report because of the unavailability of needs records. A fire in early March 1976 destroyed all available records. It is the intention of the Environmental Engineering Division of the Agency of Environmental Conservation to have an update of the State's facilities needs available by the fall of 1976.

Waste load allocations have not been made a critical factor in the design of treatment facilities in the past. Preliminary assessment of future design waste loadings and receiving waters could develop significant dissolved oxygen deficits at design treatment loadings reducing the water quality below present standards. Table 2 lists those receiving waters (segments) that will require additional water quality studies to verify these preliminary assimilative capacity assessments.

It is critical that these needed water quality studies be conducted at the earliest possible time so that this information can be used to design new wastewater pollution control facilities or existing facilities.

Vermont's basic water quality problems are still concerned with over-enrichment of standing bodies of water by nutrients – phosphorus and nitrogen – and by coliform bacteriological organisms in flowing waters. Vermont also has a substantial number of fragile upland streams where existing high quality water must be protected from degradation.

In an effort to retard the over-enrichment of standing bodies of water in Vermont, a major commitment was made to begin to reduce the amount of phosphorus entering Vermont waters from point sources. The point source additions of phosphorus to Vermont waters are chiefly domestic waste discharges. Whereas certain practices could help to minimize the effects of non-point source additions of nutrients to our waterways, it is the point sources which are most readily controllable.

TABLE 2

RECEIVING WATERS REQUIRING ADDITIONAL WATER QUALITY SOURCES FOR DETERMINATION OF FUTURE ASSIMILATIVE CAPACITY CAPABILITIES

River Basin	Segment	Description
Winooski River	**Main stem**	**Below discharge from IBM to confluence with Lake Champlain (≈15 miles)**
	Stevens Branch	**Below discharge from Barre City to confluence with Winooski River**
	Jail Branch	**Proposed discharge point of East Barre Wastewater Treatment Facility to Stevens Branch**
Otter Creek	**Main stem**	**Below Rutland City discharge to confluence with Lake Champlain (≈70 miles)**
Passumpsic River	**Water Andric Brook**	**Below discharge from proposed Danville Wastewater Pollution Control Facility (2.0 miles)**
Walloomsac River	**Main stem**	**Below discharge from Bennington to New York State line**
Hoosic River	**Main stem**	**Below Pownal Tannery to New York State line**
LaPlatte River	**Main stem**	**Below Hinesburg Wastewater Treatment Facility**
Stevens Brook	**Main stem**	**Below City of St. Albans**
Sacketts Brook	**Main stem**	**Below Putney**

Recent studies of standing bodies of water in Vermont indicate that either nitrogen or phosphorus is the limiting nutrient. Phosphorus of the two elements is the most easily controlled. Based upon recent studies, approximately 50 percent of the phosphorus in domestic sewage originates in household detergents. It was determined that enactment of a ban on phosphorus in household cleaning products would reduce by about 25 percent the total amount of phosphorus received by Vermont waters. It is fully realized by the Department of Water Resources that a phosphorus detergent ban alone will not be a "cure-all" nor even an instant cure to all of our eutrophication concerns. It may take up to 5 or even up to 10 years to show pronounced and demonstrable effects. This action coupled with phosphorus removal facilities at selected wastewater treatment facilities, a program to which the Department is committed but is also greatly dependent upon the receipt of Federal funds, should reduce greatly the phosphorus input from point sources.

In the closing hours of Vermont's 1976 Legislative Session, several key issues failed to be resolved regarding the banning of phosphate detergents. Consequently, the bill to ban phosphate detergents failed to receive approval in 1976.

The magnitude of the contribution of non-point source nutrients to Vermont waters is not fully known. Recent studies by the Department of Water Resources and the United States Environmental Protection Agency (EPA) on Lake Champlain, Lake Memphremagog, Lake Bomoseen, Lake St. Catherine, as well as a number of smaller lakes indicate that non-point nutrient contributions are significant. Two studies were initiated during 1975 – LaPlatte River – Shelburne Bay/Stevens Brook – St. Albans Bay Study and the Sleepers River Project – to begin to assess non-point source nutrient loadings. Preliminary results should be available from these studies by late August 1976. Once available, the data will be used to assess watersheds with similar land use practices and non-point source pollution loadings. The Department of Water Resources is currently negotiating with EPA's Region I for funding to support a two-year non-point source study of the Black River Basin in northern Vermont. An initial effort to identify potentially troublesome non-point source areas throughout Vermont has been made in conjunction with the Department's first phase Section 303(e) continuing water quality management planning process.

The level of coliform bacteriological organisms in flowing waters occasionally presents itself as a basic water quality problem in Vermont. Data collected from waterways receiving virtually no point source discharges continue to show levels in excess of the criteria established in the water quality standards. Non-point runoff originating from agricultural, forested and urban areas are essentially responsible for these elevated bacteriological levels. Being non-point in nature, these non-point sources are not currently economically controllable. Continued sampling will enable us to further evaluate this problem in Vermont.

The Department plans to have completed by June 30, 1976 all of its first phase Section 303(e) basin planning. At present, 11 of Vermont's 15 designated water quality management basins have gone to public hearing for review. These plans deal primarily with the water quality aspects of water resources management. As such, each basin plan inventories the significant waste discharges in a basin: It identifies water quality standards and areas where certain parameters fall below standards; assesses future waste treatment needs; cites effluent limitations and schedules of compliance contained in temporary pollution permits and discharge permits; assesses existing controls over residual wastes; identifies the trophic state of lakes; and describes the basin monitoring and surveillance programs. These plans would enable the development of a management program that will result in achieving and maintaining water quality which is equal to or better than adopted water quality standards.

Vermont's water quality monitoring programs continue to be an integral aspect of the State's water pollution control program. During 1975, the statewide primary monitoring network was operated utilizing approximately 60 stations. These stations have for the majority been located at the mouths of the major waterways flowing from the State. The remaining stations are located above and below potential problem areas. Additional network stations are established following review of data obtained from basin monitoring surveys or as a result of the review of a NPDES discharge permit. Three new primary monitoring stations were established in 1975: (1) Moose River – above and below Fairbanks-Morse discharge; (2) Passumpsic River – above and below E.H.V. Weidmann discharge; and (3) Ompompanoosuc River – just below Copperas Brook confluence with Ompompanoosuc River. Data collected in conjunction with Vermont's primary monitoring network system is currently being stored in the Water Quality file of the STOrage and RETrieval (STORET) system. The data will be used to develop water quality trends throughout Vermont as more data become available. Extreme seasonal water quality variations in Vermont does not allow for developing trends with the current available data.

All primary network stations were sampled four to five times for the following list of chemical analyses: Dissolved oxygen, temperature, pH, turbidity, conductivity, chloride, total hardness, calcium hardness, alkalinity, total phosphorus, ammonia nitrogen, nitrite-nitrate nitrogen, total coliform and fecal coliform.

Compliance monitoring represents a major aspect of Vermont's monitoring program. This program is directed at verifying effluent quality reported by municipal and industrial wastewater pollution control facilities discharging under authority of either an NPDES permit or a State discharge permit. Each facility is visited at least once annually by the Department for verification of effluent quality. Self-monitoring reports submitted to the Department by permit holders are reviewed on a continuous basis as they are received. The Environmental Engineering Division made approximately 500 reconnaissance inspections during 1975.

As mentioned in the 1974 Water Quality Assessment 305(b) Report, the Department of Water Resources conducted studies of various lakes to determine the trophic levels and their problems of eutrophication. The lakes studied were Lake Caspian, Lake Elmore, Lake Eden, Lake Parker, Lake Bomeseen, Lake St. Catherine and Lake Hortonia. These studies were completed and comprehensive reports including recommendations for restorative activities have been completed. These reports are awaiting publication at which time they will be made available to the public.

In the fall of 1975, eleven new lakes were selected for similar studies. These lakes included Holland Pond, Lake Salem, Lake Carmi, Lake Fairlee, Lake Groton, Beebe Pond, Sunrise Lake, Sunset Lake, Echo Lake, Lake Amherst and Lake Rescue. At this time both the fall and winter sampling of these lakes has been completed and the spring work is commencing. These studies will terminate in the fall of 1976 and reports similar to those written in 1975 will be completed.

In addition to the lake survey program, the Department is responsible for assessing and recording treatment of aquatic nuisance conditions. These nuisances generally are related to excessive weed and algae growths in the lakes in Vermont. The Chief Biologist is responsible for administering permit applications for the use of pesticides in State waters.

In an attempt to minimize pesticide use in our waters, we have explored the use of alternative methods. During the summer of 1975, we participated in a weed harvesting project which took place on Lake Bomoseen in Castleton, Vermont. Large harvestors were used to reap and dispose of over 100 acres of weed growth. The results are promising and it is hopeful that we may participate in an expanded program in 1976.

Table 3 summarizes the State's water quality inventory including non-segmented river miles which are those river miles upstream of the upper-most discharges in a given basin. It has been assumed for the purposes of this report that all non-segmented river miles are currently meeting water quality standards since these waters are not receiving any pollution discharge and non-point problems are minor.

On the basis of the information reported in Table 3, Vermont has approximately 5,000 miles of streams and rivers. Forty-three percent (2,100 miles) of these stream/river miles have drainage areas of 10 square miles or greater. Seventy-eight percent (3,800 miles) are non-segmented river miles and twenty-two percent are segmented. Currently, 62 percent of the segmented river miles are meeting Class B standards with an additional 20 percent expected to meet them by 1983. This will increase from ninety-two percent to ninety-six percent the total miles meeting Class B standards.

TABLE 3

STATE OF VERMONT 305(b) WATER QUALITY INVENTORY SUMMARY

Basin	No.	Total miles	Total miles with drainage area of 10 square miles or greater	Total segmented miles*	Total segmented miles *now* meeting Class B (fishable, swimmable)	Total segmented miles expected to meet Class B by 1983	Total segmented miles *now* meeting State WQ stds.	Total segmented miles *now not* meeting state WQ stds.	Total *non*-segmented miles**	Total miles now meeting Class B (fishable, swimmable)	Total miles expected to meet Class B by 1983
Battenkill Walloomsac Hoosic	1	223	90	46	25	43	27	19	177	202	220
Poultney Mettawee	2	176	91	44	36	40	38	6	132	168	172
Otter Creek Little Otter Creek Lewis Creek	3	467	317	83	70	76	77	6	384	454	460
Lake Champlain	4 & 5	116	54	25	19	20	23	2	91	110	111
Missisquoi River	6	245	153	88	61	82	20	67	157	218	239
Lamoille River	7	412	183	90	21	69	14	70	322	343	391
Winooski River	8	599	255	115	72	95	85	30	484	556	579
White River	9	452	147	69	54	59	59	10	383	437	442
Ottauquechee Black	10	244	110	65	19	38	37	28	179	198	217
West, Williams Saxtons	11	341	167	76	71	74	74	2	265	336	339
Deerfield	12	155	65	34	24	34	16	18	121	145	155
Connecticut	13 & 16	679	152	238	153	170	172	66	441	594	611
Stevens, Wells Waits, Ompompanoosuc	14	271	114	16	6	12	6	10	255	261	267
Passumpsic	15	315	142	47	20	28	25	22	268	288	296
L. Memphremagog Black Barton, Clyde	17	241	104	67	35	61	35	32	174	209	235
Total		4,936	2,144	1,103	686	901	708	388	3,833	4,519	4,734
% of total miles		–	43	22	14	18	14	8	78	92	96

*Segmented miles River miles affected by municipal and industrial discharges.

**Non-segmented miles River miles without polluting discharges and assumed to be meeting water quality standards.

APPENDIX A
Summary - State of Virginia

Complete copies of the State of Virginia 305(b) Report can be obtained from the State agency listed below:

Virginia State Water Control Board
P.O. Box 11143
Richmond, VA 23230

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Summary

Virginia is a water-rich State with nine major river systems, or basins, totaling over 27,000 miles of streams and over 500 square miles of coastal wetlands and embayments. Water pollution control is made complex by estuarine characteristics, sensitivity of shellfish areas and the relatively low flows of many streams. High water quality and absence of significant pollution problems, in except relatively few areas of the State, reflect a long-standing and aggressive water pollution control program.

Stream Segment Inventory

In 1973, the Virginia State Water Control Board (SWCB) prepared an inventory and provisional classification of 148 stream segments of interest for pollution control in its submittal of the State Continuing Planning Process, pursuant to Section 303(e) of the Federal Water Pollution Control Act of 1972. These segments include:

- 69 segments that should be able to meet water quality standards using point source controls as required by Congress to be available by 1977. These were designated as "effluent-limited" segments.
- 79 segments where more stringent controls might be required to meet standards, or where new sources might threaten to degrade water quality. These were designated as "water quality limited" segments.

The stream segments were reviewed and updated, and a discussion of each segment can be found in the river basin chapters of the report.

Figure 1 displays the stream segment classification for the State of Virginia. Also shown is the status of the individual stream segments relative to the 305(b) (1) (B) criteria* for the years 1975 and 1983. As can be seen, the total number of streams in 1975 not meeting the criteria as compared to those that are, is not excessively large. A point to remember is that these segments were defined in areas of interest for pollution control. With this point in mind and the fact that these were defined in 1973 and that Virginia has had an aggressive pollution control program, 87 (58.8 percent) of the segments are not meeting 305 (b) (1) (B) criteria in 1975. However, it is projected that because of pollution control projects now underway and planned that 97 segments (65.5 percent) will meet the criteria by the year 1977.

By 1983, as Figure 1 shows, it is projected that two segments may not meet the objectives of the Act. One of these segments (Number 1), the North Fork Holston River, has a mercury and dissolved solids pollution problem. Average total dissolved solids exceed 500 mg/l as a result of discharges from natural salt springs and an abandoned industrial plant which utilized the Solvay and electrolytic chlorine processes for the production of soda ash, chlorine and related products. Mercury deposits from the plant in the river sediments continue to be absorbed by fish beyond Food and Drug Administration limits. Total dissolved solids and mercury concentrations in the river should decrease with time, but again it is difficult to predict if water quality standards and the national goal of the Act will be met by 1983 by such a natural decay process. However, investigations have been initiated to determine what can be done to alleviate the problem.**

Contrary Creek (Number 2, Figure 1) is subject to pollution by non-point sources containing high concentrations of dissolved metals from three inactive mines and their spoil piles. The pyrite-laden acid waste is leaching into Contrary Creek. The SWCB has received an EPA Demonstration Grant to be used in reclaiming the mine waste areas and abating the water quality problem. A feasibility study is also being developed to address the dissolved metals problem. Because of the complexity of the problem, it is difficult to project a date for complying with the national goals of the Act. Thus, the segment is qualified as possibly not meeting the 1983 national goal.

Table 1 is another analysis of the segment classification of Virginia streams as compared to stream miles and the 305(b) (1) (B) criteria. The total stream miles in each of Virginia's nine river basins is compared to the national goal of the Act for the years 1975, 1977 and 1983. The table shows of the total 27,240 miles of the streams only 2,288.2 miles (8.4 percent) are not presently (1975) meeting the criteria of the Act. In 1977, this is reduced to 1,430.9 miles (5.2 percent) and in 1983 only 90.5 miles of stream or 0.3 percent of the total 27,240 miles may not meet the national goal. These areas were previously discussed above. The data displayed in Table 1 are indicative of Virginia's aggressive pollution control programs being administered through Federal and State grant programs. Pollution problems are, without exception, limited to discrete stream segments, generally not more than a few miles of stream. Pollution abatement projects under construction by municipalities or called for in the National Pollutant Discharge Elimination System (NPDES) should eliminate most of these problems within the next five to eight years.

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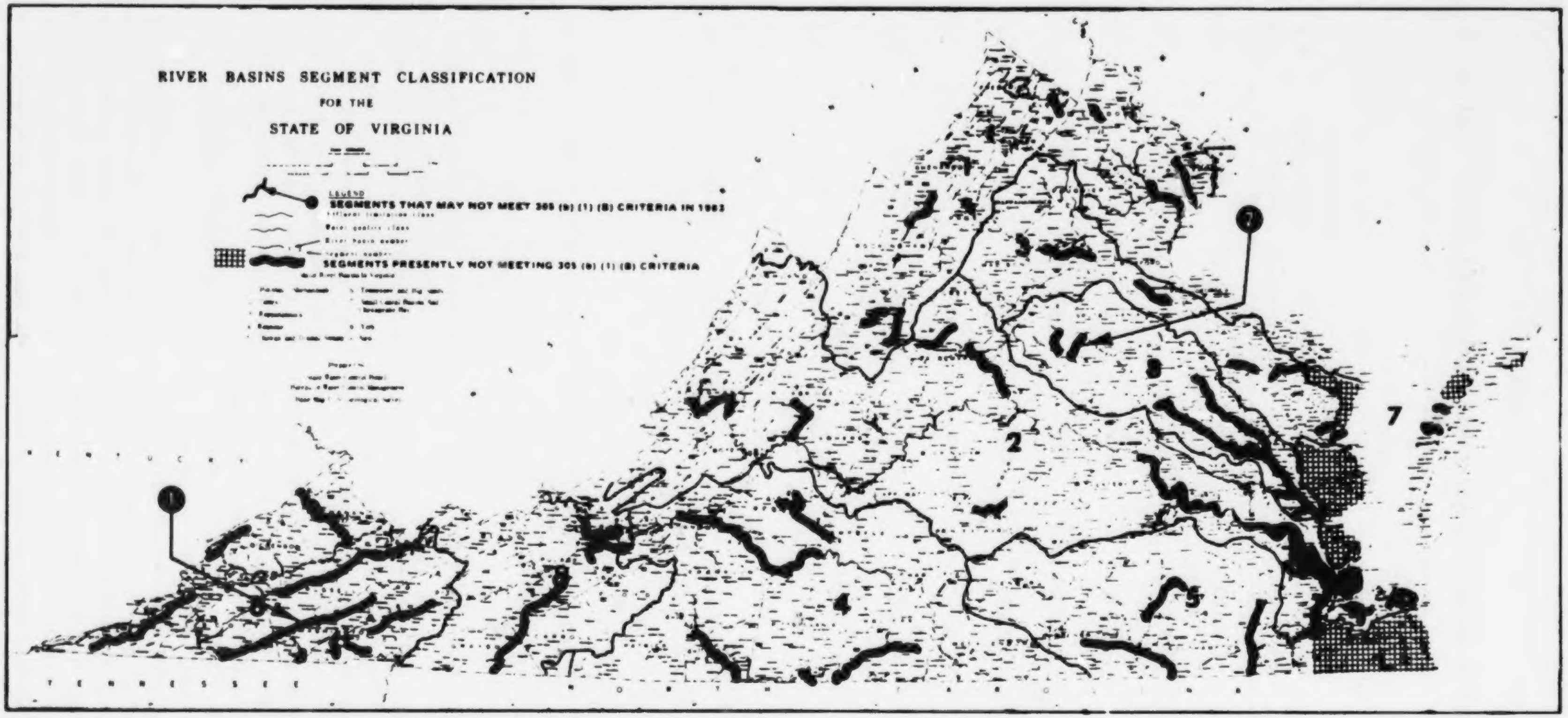
*This is defined as "the extent to which all navigable waters . . . provide for the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water."

**Section 115 ("In-place Toxic Pollutants") of PL 92-500 provides that the EPA Administrator is to identify the location of in-place pollutants (emphasis on toxic pollutants) in the Nation's waterways, and that acting through the Secretary of the Army, U.S. Army Corps of Engineers, is to make contracts for the removal and disposal of such materials. PL 92-500 authorized $15 million to be appropriated to carry out the provisions of this section.

FIGURE 1

STREAM SEGMENTS NOT MEETING 305 (b) (1) (B) CRITERIA IN 1975 AND 1983 *


RIVER BASINS SEGMENT CLASSIFICATION
FOR THE
STATE OF VIRGINIA
LEGEND
SEGMENTS THAT MAY NOT MEET 305 (b) (1) (B) CRITERIA IN 1983
Water quality class
River basin number
Segment number
SEGMENTS PRESENTLY NOT MEETING 305 (b) (1) (B) CRITERIA
KENTUCKY
TENNESSEE
NORTH CAROLINA
1
2
4
5
7

* 305 (b) (1) (B) CRITERIA - NAVIGABLE WATER SHALL BE OF THE QUALITY TO PROVIDE FOR THE PROTECTION AND PROPAGATION OF A BALANCED POPULATION OF SHELLFISH, FISH, AND WILDLIFE, AND ALLOW RECREATIONAL ACTIVITIES IN AND ON THE WATER.

TABLE 1

SUMMARY OF VIRGINIA STREAM MILES NOT MEETING 305(b) (1)(B) CRITERIA

	1975			1977		1983	
Basin	Total stream miles in basin	Stream miles not meeting criteria	% of total	Stream miles not meeting criteria	% of total	Stream miles not meeting criteria	% of total
*Potomac-Shenandoah	3,430	278.0	8.1	21.1	0.6	0	0
James	5,560	292.0	5.2	217.8	3.9	0	0
Rappahannock	2,190	168.6	7.7	28.6	1.3	0	0
Roanoke	4,550	255.0	5.6	183.9	4.0	0	0
Chowan-Dismal Swamp	2,680	329.3	12.3	176.6	6.6	0	0
Tennessee and Big Sandy	4,140	424.4	10.2	336.2	8.1	81.0	2.0
Small coastal basins and Chesapeake Bay	860	110.5	12.8	104.5	12.1	0	0
York	2,040	251.0	12.3	233.5	11.4	9.5	0.5
New	1,790	179.4	10.0	128.7	7.2	0	0
Total	27,240	2,288.2	8.4	1,430.9	5.2	90.5	0.3

*This report does not address the main stem of the Potomac River, only those streams located in Virginia are included.

Source: Virginia State Water Control Board.

Pollution Control Program Results

High water quality and absence of significant pollution problems reflect a long-standing and aggressive water pollution control program in Virginia. Total pounds of pollutants (BOD_5 and suspended solids) from municipalities, including their connected industrial load, have declined consistently for the past few years despite continued population and industrial growth. At the end of 1975 these stood at approximately 120,000 lbs/day and 100,00 lbs/day for BOD_5 and suspended solids, respectively, as compared to maximum monthly averages of approximately 237,000 lbs/day (BOD_5) and 153,000 lbs/day (SS) in earlier years (see Chapter 11-NPDES). Almost all Virginia communities have sewage treatment and most have secondary or higher levels of treatment. Phosphate removal has been obtained at six existing plants through the use of "interim" chemical addition systems (generally required by the SWCB) resulting in a reduction in phosphorus discharge of 5,000-6,000 pounds. All industrial plants have, under Virginia's permit system, installed waste treatment systems and most are relatively effective. At the end of 1975, these permits allowed a total BOD_5 discharge of approximately 354,000 lbs/day and call for a reduction to approximately 140,000 lbs/day in the future (1977-1980).

Mining Waste Discharges

Virginia has extensive soft coal resources in four of its southwestern counties (Buchanan, Dickenson, Russell and Wise). All major operating mines are under discharge permits (75) and ten hold no-discharge permits issued by the SWCB. No significant water pollution control problems are associated with either active or worked out deep mines.

Agriculture Waste Discharges

Waste discharges from agriculture have been controlled to a significant degree through treatment of wastes by lagoons, controlled livestock access to streams in coastal shellfish waters, and through participation in Soil Conservation Service programs.

Federal Facilities Discharges

Waste discharges from Federal facilities are estimated at about five percent of total municipal loads. However, the Commonwealth has been unable to obtain reliable information on waste treatment practices at Federal installations.

Vessel Discharges

The State has approximately 11,600 registered vessels and its Hampton Roads and naval facility ports, visited by an estimated 3,900 vessels, are among the greatest in the world. The State has adopted regulations governing the disposal of vessel wastes; however, the unwillingness or inability of the United State Coast Guard to promulgate regulations has muted the efforts of the State.

Combined Sewers

Virginia's older communities (14 signigicant problem areas) have combined sewer systems in portions of their service areas. These systems allow periodic discharge of significant quantities of untreated sewage and are partially responsible for degraded water quality in adjacent or downstream waters. The SWCB has worked with these communities over the years in their attempt to minimize the problem. At the present time, the three major areas (cities of Alexandria, Lynchburg, and Richmond) have been recommended for grant assistance to make feasibility studies to determine the most cost-effective methods to eliminate and control the problem.

Oil and Hazardous Material Spills

During 1975, the SWCB received 322 reports of oil pollution in Virginia. The reports involved a total spillage of 366,982 gallons. The United States Coast Guard (Hampton Roads) received an additional 566 spill reports in Virginia waters during calendar year 1975. These spills involved 184,621 gallons of petroleum product. There were 21 hazardous chemical spills during 1975 involving 40,050 pounds and 47,049 gallons of material.

Non-point Source Urban Pollution

There is a demonstrated significant problem in only one area of the State (the Occoquan Watershed in the Washington metropolitan area), although the problem may also be a contributing factor to water quality deterioration in the Potomac estuary downstream from the Washington metropolitan area. Nutrient removal systems are under construction at those points at which a cause-effect relativity has been established.

Pesticides

In 1973, the SWCB initiated a seasonal pesticide monitoring program consisting of about 150 stations throughout Virginia. Stations were located at suspect or potential problem areas. Although pesticides are used extensively there is little evidence that other than relatively few localized problems exist.

In 1975 an unusual problem became apparent when it was discovered that toxic pesticide ingredient, Kepone, was being discharged to the Hopewell Sewage Treatment Plant from an industrial discharger. This and other incidents caused the closing of the lower James River by the Governor of Virginia for fishing and other uses.

The Kepone controversy is being investigated through Federal hearings and the SWBC is cooperating with the Governor's Kepone Task Force to gather information on the extent of the hazard. Special river surveys are being performed to determine the concentration and distribution of Kepone in the estuarine waters and sediments. Observation wells are being monitored to determine the distribution, concentration and transport of Kepone in the groundwater. Surveys of selected streams are being performed during the rainfall-runoff events to determine the concentration of Kepone in the water and thus the extent to which Kepone was carried by wind away from its source to surrounding land areas. Fish in the estuary are also being studied to determine the concentration of Kepone in their tissues and this information along with information from the sediment samples will provide the Task Force with an analysis of the extent to which Kepone has been taken up in the food chain. All of these surveys combined will enable the Task Force to make an evaluation of the extent of the hazard, if any, that is present and to decide upon the proper measures necessary to minimize any hazards that may exist.

Fish Kills

During 1975, 168 fish kills were reported in Virignia's waters. These represent not only pollution-caused fish kills but also natural kills as well as kills occurring in private ponds, in most cases resulting from nutrient enrichment from livestock and fertilizer runoff.

Approximately 15 percent of Virginia's fish kills are pollution related. The majority of these kills are isolated incidents resulting from one-time spills, accidents, or other mishaps occurring throughout the State's nine major river basins.

In-Place Pollutants

Toxic qualities of in-place pollutants are recognized in only four areas of Virginia (Hopewell, North Folk Holston, Elizabeth River and Contrary Creek). Programs for eliminating the problems are being investigated.

Sediment/Turbidity

Sediment discharges have a physical effect in some reservoirs, and are detrimental to the ecology of upper estuarine areas of the major river basins, but there are inadequate data to quantify the effects. Turbidity problems have been found in Levisa Fork and those southwest Virginia basins below coal mines from high settleable solids concentrations. Swift Creek Reservoir near Richmond is the subject of a special study to quantify the turbidity problem there. There are no data for other parts of the State which would indicate problems.

Basin Water Quality Trends

Analysis of the SWCB ambient water quality network data were performed for each river basin in Virginia in an attempt to determine water quality trends. The data were compared for two time periods, 1968-71 and 1972-75, to reference levels chosen to reflect those levels that would protect aquatic life or the public health. From the interpretation of these analyses, water quality trends can be determined.

Potomac-Shenendoah Basin

With the exception of an increase in certain nutrients, the general water quality in the Potomac-Shenandoah Basin in Virginia is quite good. Trends of improving water quality have appeared for the following water quality parameters: Dissolved oxygen, pH, fecal coliform bacteria, total phosphate and ammonia. Total orthophosphate, nitrate and Kjeldahl nitrogen showed varying degrees of worsening trends which are not limited to isolate areas.

James Basin

With the exception of certain notable water quality problem areas, the water quality in the James River Basin is good. Improving trends have appeared for the following water quality parameters: Dissolved oxygen, pH, fecal and total coliform bacteria, total phosphate, total nitrate, total Kjeldahl nitrogen and ammonia.

Water temperature, suspended solids, nitrites and chlorides showed slight trends of improvement over conditions that are minor initially. Orthophosphates were the pollutants that consistently appeared with worsening trends and these are confined to a few areas of the basin.

Rappahannock Basin

Except for the Fredericksburg area, the water quality in the Rappanannock River Basin is very good. Trends of improving water quality have appeared for the following water quality parameters: Fecal and total coliforms, total Kjeldahl nitrogen, ammonia and total phosphate. Small improving trends are associated with dissolved oxygen, pH and water temperature which had minor reference level "violations" for both time periods.

Orthophosphates, nitrites and nitrates showed worsening trends in limited areas of the basin.

Roanoke Basin

Fecal coliform bacteria, pH, total phosphate, ammonia and total Kjeldahl nitrogen show an improving water quality trend in the Roanoke River Basin. Orthophosphate and suspended solids show a slight worsening trend. Dissolved oxygen and water temperature did not show any appreciable change for the two time period comparisons.

Chowan-Dismal Swamp Basins

Dissolved oxygen, pH and fecal coliform bacteria tend to show an improving trend for the 1972-75 time period. Nutrients appear to have a worsening trend. Total orthophosphate, phosphate and Kjeldahl nitrogen reference level "violations" increased for the more recent time period. However, many areas in the basin have high nutrient values because of natural swamp conditions.

Tennessee-Big Sandy Basin

Trends of improving water quality exist in the Tennessee-Big Sandy River Basin for the following water quality parameters: Dissolved oxygen, fecal coliform bacteria, water temperature, pH, suspended solids, total phosphate, total Kjeldahl nitrogen and chlorides.

Slightly worsening trends for orthosphosphates, ammonia and nitrate occurred, but these small increases in the level of the pollutants are dwarfed by the substantial improvements in the eight parameters listed above.

Small Coastal Basins and Chesapeake Bay

Trends of improving water quality have appeared for the following water quality parameters: Total suspended solids, pH, fecal and total coliform bacteria, total phosphate, total Kjeldahl nitrogen and ammonia.

Dissolved oxygen, water temperature, nitrate and nitrite show slight but almost insignificant worsening trends. Orthophosphate was the pollutant that consistently showed up with a worsening trend confined to a few areas of the basin.

York Basin

In general, the western headwaters of the York River Basin appear to be of excellent water quality, with some water quality problems evidenced in the Pamunkey, Mattaponi and York Rivers. Trends of improving water quality appeared for the following parameters: Dissolved oxygen, pH, fecal coliform bacteria and total Kjeldahl nitrogen.

Orthosphosphates, nitrates, nitrites and ammonia show worsening trends in the Basin. However, the nitrate and nitrite trends are not as significant as those for orthophosphates.

New Basin

In the New River Basin, trends of improving water quality appear for the following parameters: Suspended solids, pH, fecal coliform bacteria, total phosphate and total Kjeldahl nitrogen. Dissolved oxygen and water temperature are more or less at status quo with few "violations" of reference levels in both time periods.

There is a significant worsening trend for orthophosphates possibly indicating a greater amount of runoff from agricultural areas.

Data Base

Conclusions as to water quality and water quality trends can be no better than the data base. The conclusions of this report are based on the SWCB staff's investigations, and analyses and interpretations of:

1. Ambient monitoring of water quality by the SWCB and the State Health Department of Shellfish Sanitation;
2. Special studies;
3. Biological monitoring;
4. Groundwater monitoring;
5. Permit compliance monitoring;
6. Pollution complaints – including fish kills and oil and hazardous chemical spill investigations;
7. Mathematical models; and
8. Stream gaging and water level recording.

The ambient water quality data base is sufficient for analyzing the water quality in Virginia's streams. However, stream flow is non-existent for this data base at the present time, and therefore stream loadings of various pollutants are very difficult to obtain. System software should be developed to incorporate the average daily stream flows from the United States Geological Survey stream gaging network, of which the SWCB is a contributing agency, into the STOrage and RETrieved (STORET) data base. This addition would enhance the data analyses.

The interpretations of the permit compliance monitoring and pollution complaints data bases were used as background for discussion. Mathematical modeling, although not used specifically in this exposition, is used by the SWBC to issue NPDES permits and for a better understanding of the river systems in Virginia.

Although there may be some discontinuities in the data base, the SWCB will attempt to close these as experience and utilization of the various data bases deem necessary.

APPENDIX A
Summary - Virgin Islands

Complete copies of the 305(b) Report for the Virgin Islands can be obtained from the State agency listed below:

Division of Natural Resources Management
Department of Conservation and Cultural Affairs
Charlotte Amalie, St. Thomas, VI 00801

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Summary

This report was prepared by the Division of Natural Resources Management, Virgin Islands Department of Conservation and Cultural Affairs with data and other inputs secured by its monitoring program and those of other agencies of the Virgin Islands Government. It was prepared as required by Section 305(b) of the 1972 Federal Water Pollution Control Act Amendments (Public Law 92-500) which calls for a report by each State assessing the water quality of all navigable waters and the waters of the contiguous zone.

Estimated cost for control actions to eliminate all pollution of the coastal waters of the Virgin Islands is:

Segment A – St. Thomas	$18,404,436
Segment B – St. John	1,920,000
Segment C – St. Croix	36,703,649
	$57,028,085

All waters of the Virgin Islands are classified as effluent-limited.

The Virgin Islands are in STORET Basin No. 19. The basin has been broken down into three segments (Figure 1) as follows:

1. Segment A – St. Thomas, 52.8 miles of shoreline
2. Segment B – St. John, 49.7 miles of shoreline.
3. Segment C – St. Croix, 70.3 miles of shoreline.

All of the waters in Segments A, B, and C are maintained in compliance with the Virgin Islands' Water Quality Standards.

Monitoring information contained in Appendix B of the report shows that water quality has improved in both Segments A and C as a result of water pollution control programs over the last five years. The most improvement has occurred in the harbor of Charlotte Amalie in Segment "A". This is a result of the construction of the Charlotte Amalie Sewerage System, which removed two-and-a-half million gallons per day of raw sewage from the waters of the harbor. Three interceptors, two force mains and two pumping stations are utilized to collect and transport sewage, previously discharged to the harbor, to a primary sewage treatment plant. The treated effluent is discharged through an ocean outfall, 2,650 feet from shore at a depth of seventy feet.

Fecal coliform counts have fallen from a high of 10,000 per 100 ml to less than 70 per 100 ml. Average Secchi depth reading have increased from less than three meters to four meters. Dissolved oxygen levels have increased from an average of 6.0 PPM to an average of 6.6 PPM.

Water quality monitoring for Segment B indicates that water quality which was previously excellent in this segment, has not changed.

In Segment C, the greatest increase in water quality has occurred along the south shore of St. Croix.

Dredging activities for developing and maintaining shipping channels to provide access to facilities owned by Hess Oil Virgin Islands Corporation in 1966-67 and Harvey Alumina Virgin Islands Corporation in 1963-64, distributed fine-grained clay deposits in a manner that caused extreme turbidity and excessive pollution along 13.8 miles, or about 47 percent, of the south coastline of the island. Enumeration of inorganic suspended solids, most assumed to be particles of clay, showed these particles exceeded densities of 150,000,000 per liter. Water clarity was reduced as much as 95 percent in many places in these turbid reaches. These conditions caused severe pollution that was almost catastropic in scope: Pollution extended seaward from the shore up to a distance estimated to be at least one mile; reefs were not readily visible, thus endangering navigation; recreational values were totally lost; seafood animals, once abundant, were decimated to unharvestable levels; and land values were seriously reduced. These turbid waters terminated abruptly at Sandy Point near the southwest cape of St. Croix, where there was a dramatic change in water clarity.

Water quality adjacent to the industrial complex on the south shore of St. Croix is presently good. Average values for all water quality parameters in this area are approximately equal to average values observed in clean waters elsewhere. Levels of most parameters also fall within the ranges observed elsewhere.

Waters outside areas of municipal and industrial development are generally clean. Quality of these waters is essentially identical around all three islands. Temperature averages 28.2°C (82.8°F). Dissolved oxygen varies from 4.4 to 8.9 mg/l. The mean dissolved oxygen level of 6.8 mg/l is well within the 5.5 mg/l required by the approved Federal-State Water Quality Standards. In Trunk Bay, St. John–where the standards require that natural conditions be maintained–the dissolved oxygen level is 6.5 mg/l. The prevailing total and fecal coliform levels are below 0.5 organisms per 100 ml. Nitrate and total nitrogen levels average 0.07 mg/l and total organic carbon averages 9.7 mg/l. Dissolved copper, cadmium, chromium and lead levels are less than 100 mg/l. Zinc and aluminum levels are approximately 300 mg/l. Mercury averages only 0.23 mg/l. Average levels of copper, cadmium, zinc, chromium, lead and mercury in bottom sediments are 13.5, 13.1, 20.0, 7.6, 38.4 and 0.022 mg/kg, respectively (based on dry weight).

In addition benthic communities have recovered substantially from past damages.

All reefs between Hess and Sandy Point were adversely affected by high turbidity and suspended and settling sediment caused by dredging. However, all of these reefs have begun to recover although recovery is being inhibited by the continued presence of high concentrations of sediment in the nearshore waters.

The following sources of pollution of Southshore waters were also eliminated or modified.

1. Waters from the V.I. Rum Distillery, Ltd. which were previously discharged at the shoreline were piped 3,000 feet from shore. Here the prevailing currents now carry the brown colored "lees" parrallel to shore until they are dissipated.

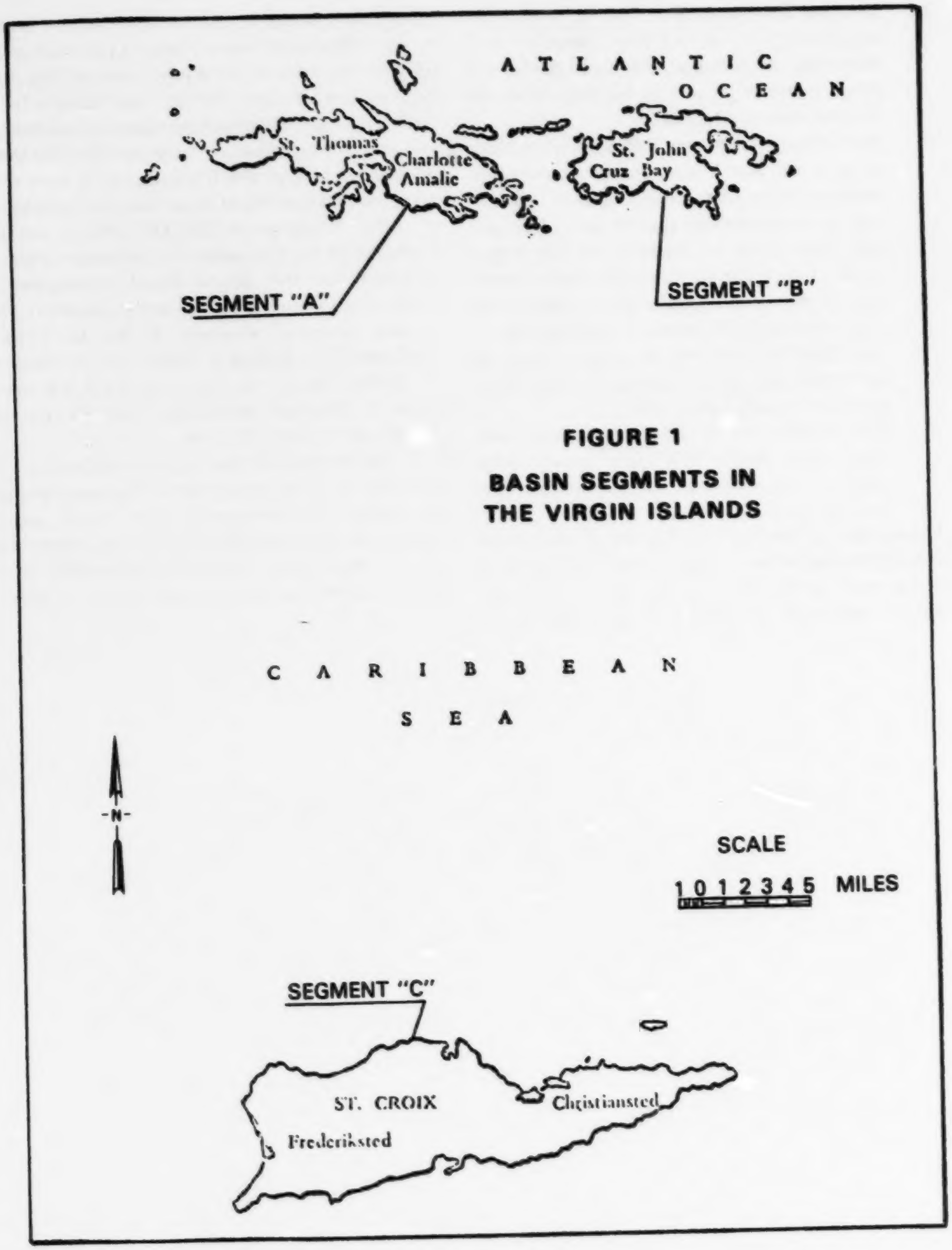
ATLANTIC
OCEAN
St. Thomas
Charlotte
Amalie
St. John
Cruz Bay
SEGMENT "A"
SEGMENT "B"
CARIBBEAN
SEA
N
SCALE
1 0 1 2 3 4 5 MILES
SEGMENT "C"
ST. CROIX
Christiansted
Frederiksted

FIGURE 1

BASIN SEGMENTS IN THE VIRGIN ISLANDS

2. The open burning dump and marine landfill was converted into a sanitary landfill. This eliminated the discharge of tin cans, bottles and other floatables, as well as leachings from the dump as sources of pollution.
3. Martin-Marietta Alumina discharges of hot saltwater from both their process cooling and desalting plants were eliminated by the installation of a nineteen-acre cooling pond. Changing the main points of discharge to the deeper water of their channel from the shallow shoreline on the western end of their property has also eliminated the constant reintrainment of clay fines deposited by the previous dredging operations, and those discharged to shore water by run off during heavy rains.
4. The construction of a primary sewage treatment plant and a 9,000-foot ocean outfall removed the discharge of raw sewage from inshore waters.

Present cause of the high turbidity and suspended and settling sediment near shore (TerEco Corporation 1973), is the re-intrainment of clay fines by wave action. These clay particles are the result of erosion of clay soils in the immediate shore areas by wave action as well as stormwater runoff. Additionally, there is leaching by wave action of the lower seaward side of the dredge—spoil settling basin on the western end of Cane Garden Bay constructed by Hess during their last dredging operations. The walls of the basin and jetty are protected by large boulders, but these do not prevent leaching of the fine material by wave action. It is expected that leaching of these fines will gradually cease.

The discharge of 300,000 GPD of raw sewage to Frederiksted Harbor ceased in November 1974 with the activation of the Strand Street Interceptor and the Frederiksted Pumping Station and Force Main. The sewage is now receiving treatment at the St. Croix Sewage Treatment Plant located at Krause Lagoon. Water quality in the harbor, which was previously good has not changed. However, the slight sewage slick from the two former discharges can no longer be seen.

No progress has been made in reducing the moderate pollution of Christiansted Harbor. However construction of the system of interceptors, force mains, and pumping stations to collect and transport all sewage generated by the town to the St. Croix Sewage Treatment Plant is underway. Completion of this system is expected late in 1976.

APPENDIX A
Summary - State of Washington

The Washington Department of Ecology (DOE) produced a water quality assessment of lakes (Volume III) as its 1976 305(b) submission. Volume III is to be used in conjunction with the two water quality status volumes submitted in 1975 to satisfy the requirements of Section 305(b).

Complete copies of the State of Washington 305(b) Report can be obtained from the State agency listed below:

Department of Ecology
P.O. Box 820
Olympia, WA 98504

Executive Summary

The nearly 8,000 lakes, ponds, and reservoirs of Washington provide water for irrigation, drinking supplies, power, and a multitude of recreational activities. Prior to 1975, management of these lakes was on an informal basis consisting of special studies to assess lake conditions without an active effort to protect and preserve their valuable roles.

It has always been implicitly implied that Washington lakes should be allowed to evolve naturally, and not be subjected to cultural eutrophication. This philosophy is born out in the State Water Quality Standards, which state that temperature, dissolved oxygen, and pH shall not measurably change from natural conditions. Two events have moved lake management into an active program in Washington State: 1) Completion of reconnaissance survey of 750 major Washington lakes by the United States Geological Survey (USGS) and the Department of Ecology; and 2) the establishment of a lake rehabilitation program by the Department of Ecology.

The reconnaissance survey, now published as "Reconnaissance Data on Lakes in Washington", Water Supply Bulletin 43 (Bortleson, et al., 1976), provides the preliminary information essential to guide the preservation of lakes and lake restoration. The results of the survey showed lakes in the eastern half of the State tended to be more eutrophic. This was reflected in the major nutrient levels and water clarity. For example, total phosphorus concentrations exceeding 0.020 mg/1 were found in 74 percent of eastside lakes and in only 27 percent of westside lakes. Water clarity, measured by Secchi disc, was less than 6 feet in 25 percent of western Washington lakes, but in 49 percent of eastern Washington lakes.

An examination of Table 1 shows that water clarity (Secchi disc less than 6 feet) is the most prevalent problem closely followed by oxygen depletion in the bottom waters (oxygen concentration less than ten percent of saturation). Visual observations by USGS researchers pinpointed 80 lakes in which the entire bottom was covered by submerged vegetation and 154 lakes which had dense algal blooms at the time of sampling.

The Department of Ecology has set up a matching grant program (50-50 split) under the Washington Future Program to help local entities to restore the water quality of lakes. Grants to determine the feasibility of rehabilitating lakes have been awarded to six projects while 13 projects are under consideration for actual implementation of construction. The availability of Federal funds will determine, to a large extent, if any of these projects will be undertaken. Unfortunately, the EPA has not seen the need to allocate the $300 million available under Section 314 of Public Law 92-500, but rather has released only $19 million for nationwide distribution under Section 104h. During this period, the Department of Ecology has available $7.35 million for restoration projects in Washington State alone.

In conclusion, the assessment of lake water quality has identified major problem areas to be water clarity, dissolved oxygen, algal blooms, and macrophyte infestations. The next step is to identify those lakes that have been impacted by pollution and move to rehabilitate them. Although Table 1 suggests that many problem lakes exist, many of the lakes are actually in a natural state and merely at an advanced stage of succession. Since only four lakes are subject to treated sewage effluent, nonpoint pollution is the principal cause of lake degradation.

TABLE 1

DISTRIBUTION OF LAKE QUALITY PROBLEMS IN WASHINGTON STATE

		Number of Problem Lakes			
Region	County	Water clarity	Macrophytes	Algal blooms	Oxygen depletion
1	Clallam	1	–	1	4
1	Jefferson	2	–	2	5
1	Island	4	–	3	4
1	San Jaun	2	1	2	2
1	Skagit	5	2	6	6
1	Whatcom	7	3	5	8
2	King	21	9	9	35
2	Snohomish	5	2	5	30
3	Kitsap	2	1	2	2
3	Mason	2	6	2	3
3	Pierce	18	9	10	21
4	Clark	3	1	2	3
4	Cowlitz	3	1	–	1
4	Grays Harbor	1	–	1	1
4	Lewis	1	1	–	1
4	Pacific	3	–	1	–
4	Skamania	5	–	3	1
4	Thurston	12	7	4	12
5	Chelan	2	–	4	4
5	Ferry	1	–	2	3
5	Kittitas	–	3	1	–
5	Klickitat	2	–	–	–
5	Okanogan	8	1	10	30
5	Yakima	9	–	2	–
6	Adams	15	2	4	3
6	Benton	2	–	–	–
6	Douglas	7	2	5	5
6	Franklin	14	4	7	–
6	Grant	32	8	19	13
6	Lincoln	34	4	25	8
6	Walla Walla	4	–	–	–
6	Whitman	9	1	6	–
7	Pend Oreille	6	6	2	8
7	Spokane	19	3	9	16
7	Stevens	1	3	–	18
State total		258	80	154	247

APPENDIX A

Summary - State of West Virginia

Complete copies of the State of West Virginia 305(b) Report can be obtained from the State agency listed below:

Division of Water Resources
Department of Natural Resources
1201 Greenbrier Street
Charleston, WV 25311

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Introduction

This report was prepared by the West Virginia Department of Natural Resources, Division of Water Resources, pursuant to Section 305(b) (1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). The report is an inventory of water quality in the State and is submitted through the Administrator, United States Environmental Protection Agency, for the Congress. The chapter on the Ohio River was prepared by ORSANCO at the request of the State of West Virginia.

Summary

Total and fecal coliform are in violation of State standards in most segments of the State's waters. These waters are generally designated for water recreation, water supply and the propagation of aquatic life. Required improvements in municipal and some industrial discharges will minimize the fecal coliform levels in the river basin. Non-point sources of total and fecal coliform bacteria will be the primary problem in determining future compliance with State standards.

The dissolved oxygen levels are of a good quality in all river basins of the State except the segment of the Kanawha River below Charleston, West Virginia. Mathematical calculations of stream loadings indicate that the oxygen level of this stream segment may not meet State standards during low flow conditions. However, the oxygen-consuming compounds have been markedly reduced by improvements in secondary treatment of industrial waste sources and secondary municipal waste treatment.

Common indicators of water quality such as temperature, dissolved solids, pH, acidity, alkalinity, chlorides, sulfates, nitrates, and phosphorus are of good quality throughout the year in most of the State's rivers. One exception is drainage from the mining industry on the Monongahela River and its three major tributaries; the Cheat River, West Fork River, and Tygart Valley River. Low pH values in violation of State standards and sulfates which often exceed reference levels for water supplies are characteristic in these streams.

The abandoned mine drainage problem persists in the State, but a program plan has been initiated to study these areas. Preparation of feasibility reports, and determining the required engineering and initiation of the construction work needed to control the mine drainage, will depend on needed State and Federal funding.

Heavy metals and toxic substances are normally below State standards. On occasion, cadmium, arsenic, and lead have exceeded State standards. Total iron and manganese exceed reference levels set for water supplies in all major rivers of the State. The metals in the water do not appear to be related to point sources, but more to urban and rural runoff.

Suspended solids in the Big Sandy-Tug Fork, Guyandotte, Kanawha, and Monongahela Basins appear to be associated with the mining industry, road construction, silviculture and urban runoff. Concentrations are generally seasonal with high solids associated with high winter flows.

In the Potomac Basin, the suspended solids are generally in an acceptably good quality range.

APPENDIX A
Summary - State of Wisconsin

Complete copies of the State of Wisconsin 305(b) Report can be obtained from the State agency listed below:

Department of Natural Resources
P.O. Box 7921
Madison, WI 53707

Summary

Wisconsin water quality during calendar year 1975 has been evaluated using information gained from basin surveys, monthly sampling at selected locations and detailed surveys conducted on streams receiving excessive amounts of wastes from point sources. Representative waterways in 19 basins have been rated as meeting State standards, intermittently violating standards, or having significant violations. Figure 1 shows the status of these streams.

The 1983 goals of supporting fish and aquatic life and providing recreational uses are met on 3,055 miles of the 3,360 miles of streams evaluated. This indicates that the vast majority of Wisconsin's streams are of very high quality. About 305 miles are degraded by point-source pollutant discharges. It is estimated that 700 miles of sample streams are affected by non-point sources such that occasional standards violations occur. Some 500 miles of small headwater streams not included in the sample are degraded by point source discharges.

The ability of a stream to support aquatic life and desired uses is dependent upon a variety of factors, both natural and relating to human influences. Specific standards exist only for parameters which have significant effects upon aquatic life and are generally amenable to treatment. Minimum standards have been established for dissolved oxygen, fecal coliform bacteria counts, temperature and pH. Standards for other parameters effected primarily by non-point source pollutants are expected to be adopted in the near future.

Dissolved oxygen depletion occurs below many Wisconsin municipalities and industries resulting from discharges of organic pollutants. Serious problems result during periods of high temperature and low flow on the Upper Wisconsin, Lower Fox, Oconto, Peshtigo and Flambeau Rivers from discharge of papermill wastes. Oxygen depletion is also a serious problem during periods of winter ice cover, especially on portions of the Wisconsin River and Green Bay. Other waste sources cause oxygen depletion though seldom to the extent seen on major paper mill rivers. Most small municipal discharges, for example, affect distances of streams averaging from two to seven miles.

Bacterial contamination of Wisconsin streams by point and non-point sources continues to be a problem as indicated by fecal coliform counts taken during routine monitoring. High counts of fecal coliform bacteria occur in numerous situations. Wildlife populations, especially in marshy areas, often cause elevated counts. Bacterial contamination of the Rock River below the Horicon marsh, a tremendous area for geese, is an example. More common causes are inadequate disinfection at sewage treatment plants, overflows or leakage from old or overloaded municipal sanitary systems and losses from private sanitary systems. Though high fecal coliform counts indicate contamination, they do not necessarily mean that a public health hazard exists. Fecal coliform bacteria are indicator organisms whose presence in large numbers shows that the probability of disease organisms being present is increased.

Violations of pH standards are uncommon and when they occur, generally affect only localized areas around outfalls. Violations of the pH standard were measured at two of the primary monitoring stations during 1975.

Temperature problems are also very uncommon in Wisconsin despite the relatively large number of electrical generating plants located in the State. Studies of cooling water discharges to Lake Michigan and the Mississippi River have uncovered few instances of environmental harm. Though thermal discharges to smaller water bodies are more likely to cause serious water quality problems, existing plants are believed to be providing adequate treatment. A close watch is being kept on the growing electrical power industry in Wisconsin.

Nutrient enrichment is a common problem especially in the southern part of the State. All categories of pollutant sources contribute to this problem. Municipal sewage treatment plants discharging to streams flowing into Lakes Michigan and Superior are required to provide phosphorus removal. Facilities have been installed at existing plants to meet this requirement and phosphorus loadings to the lakes have been significantly reduced. Agricultural contributions of phosphorus are reduced with improved land management practices since phosphorus is adsorbed to soil particles and is lost as soils are eroded. Loss of nitrogen is more difficult to control since it more readily dissolves in water.

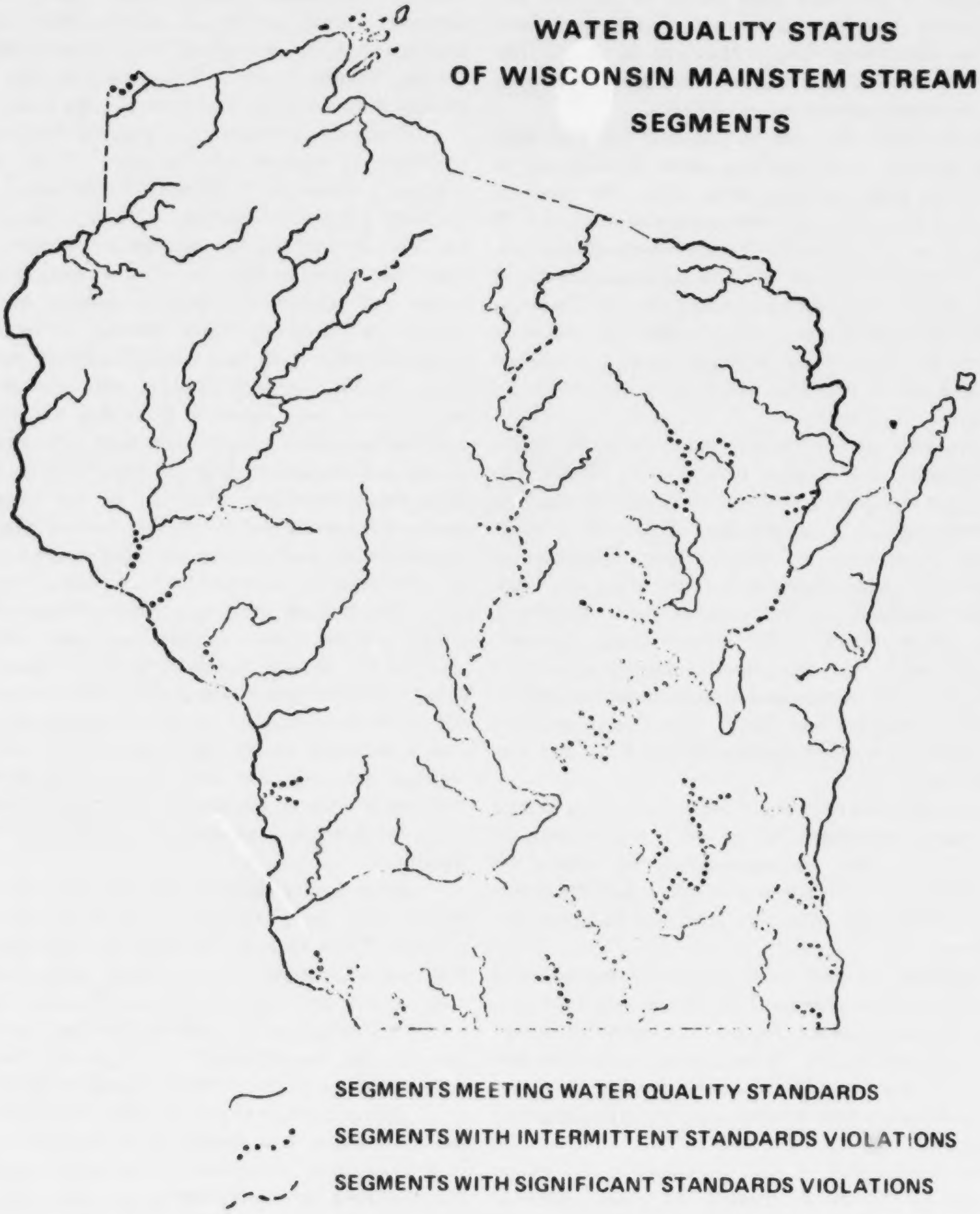
Suspended solids and nuisance growths of algae and rooted aquatic plants cause aesthetic problems on many streams that meet quality criteria established in State standards. The more productive streams in southern and eastern Wisconsin generally exhibit weed growth and algae problems due in large part to availability of nutrients. Sediment loadings depend on soil type, topography and land use. Heavy loadings of suspended sediments occur in southwest Wisconsin where slopes are steep and in northern areas where extensive areas of red clay soils are found.

Serious aesthetic degradation occurs on some stream segments immediately below waste discharges, notably certain pulp and paper mills. A number of mills discharge large amounts of solids which accumulate on river bottoms. As these materials decompose, odorous gasses are produced which at times lift matts of fibrous sludge to the surface producing very objectionable aesthetic problems. Organisms growing in polluted water such as slimes and sludgeworms also cause aesthetic conditions that are objectionable to most people. Water quality improvements noted below have generated significant improvement in aesthetic conditions on some major Wisconsin rivers.

Several types of hazardous materials discharged to surface waters have reached dangerous levels in water or in the tissues of aquatic organisms. A group of industrial chemicals, polychlorinated biphenyls (PCB), is an important example. Levels of PCBs in fish taken from Lake Michigan, Green Bay, Lake Pepin on the Mississippi River

FIGURE 1

WATER QUALITY STATUS OF WISCONSIN MAINSTEM STREAM SEGMENTS


SEGMENTS MEETING WATER QUALITY STANDARDS
SEGMENTS WITH INTERMITTENT STANDARDS VIOLATIONS
SEGMENTS WITH SIGNIFICANT STANDARDS VIOLATIONS

and the Fox River near Portage have exceeded tolerance levels recommended by the Food and Drug Administration. Sources of PCBs in Wisconsin include municipal treatment plants, paper mills that recycle wastepaper, some aluminum foundries, and fallout from the air. State legislation was developed during 1975 to limit discharges of these chemicals to surface waters.

Loss of pesticides to surface waters is a problem since some of the chemicals used are accumulated in the food chain causing changes in behavior, impaired reproduction and, in some cases, death of predator species. Pesticides that are allowed only limited use in Wisconsin include DDD, endrin, aldrin, dieldrin, heptachlor, lindane, BHC and alkyl mercury compounds. Use of DDT has been banned in Wisconsin.

Mercury contamination constitutes a health problem on sections of the Wisconsin, Chippewa, and Flambeau Rivers as fish taken from these streams commonly exceed the tolerance level established by the Federal Food and Drug Administration. Fishermen have been advised to limit consumption of fish from these waters to one meal per week. Another toxic metal problem is localized contamination of the Menominee River in Marinette by arsenic. The company involved is studying improved process methods and has upgraded chemical storage facilities.

During 1975, 188 spills of hazardous materials were reported. Gasoline or oil were involved in 160 cases and 16 involved toxic materials. Most of the spills (102) occurred at fixed facilities, while 33 involved autos or trucks and 19 were marine or railroad spills. One spill involved a pipeline.

Five pollution-caused fish kills were reported during 1975. Four were heavy kills involving game fish. Causes of the kills were determined to be related to industrial operations in three cases, discharge from a municipal treatment plant in one case, and manure runoff from a holding pond in another.

Most water quality improvement noted so far results from programs existing before passage of PL 92-500. The most obvious changes are aesthetic improvements resulting from elimination of gross pollution. Reduction of solids discharges from the St. Regis Paper Company at Rhinelander is a prime example. Portions of the Fox River have also exhibited aesthetic improvements as well as apparent improvements in DO concentrations. Improvements indicated by data from monthly monitoring over the past ten years include decreases in fecal coliform counts on the Wolf, Chippewa and Sugar Rivers, and apparent improvements in nutrient loadings on the Rock and Fox (Illinois) Rivers.

Wisconsin lakes have been classified according to their trophic status. According to the scheme developed, 30 percent of the lakes are oligotrophic, 50 percent are mesotrophic and 20 percent are eutrophic. Satellite photo-imagery is being used to further refine the lake classification system.

Abatement of most point-source pollution problems is believed to be possible by 1983 if adequate funding is provided for municipal construction and legislative support is not withdrawn. Indeed, to back away from established goals at this point would effectively penalize firms and communities which have acted responsibly in meeting their obligations.

The interim goal of best practicable treatment has been met by 21 of Wisconsin's 73 major industrial dischargers, 41 additional firms are expected to meet 1977 effluent limits, and 11 are expected to fail to meet the 1977 limits. Of the 557 municipalities discharging to surface waters, 115 (21 percent) have treatment systems capable of meeting 1977 standards. Secondary treatment plants in 386 communities require upgrading or replacement and 56 primary treatment plants need to be replaced with more advanced systems. If 1983 goals are not abandoned, support of fish and aquatic life is expected to be attained on 98 percent of Wisconsin streams. One percent will have occasional violations and the remaining one percent will not meet standards because of background conditions or irreversible cultural alterations. Problems expected to remain include storm sewer discharges, combined sewer overflows, uncontrolled urban and agricultural runoff and some point source pollutant discharges. Figures 2 and 3 show the projected status of Wisconsin streams after attainment of 1983 goals.

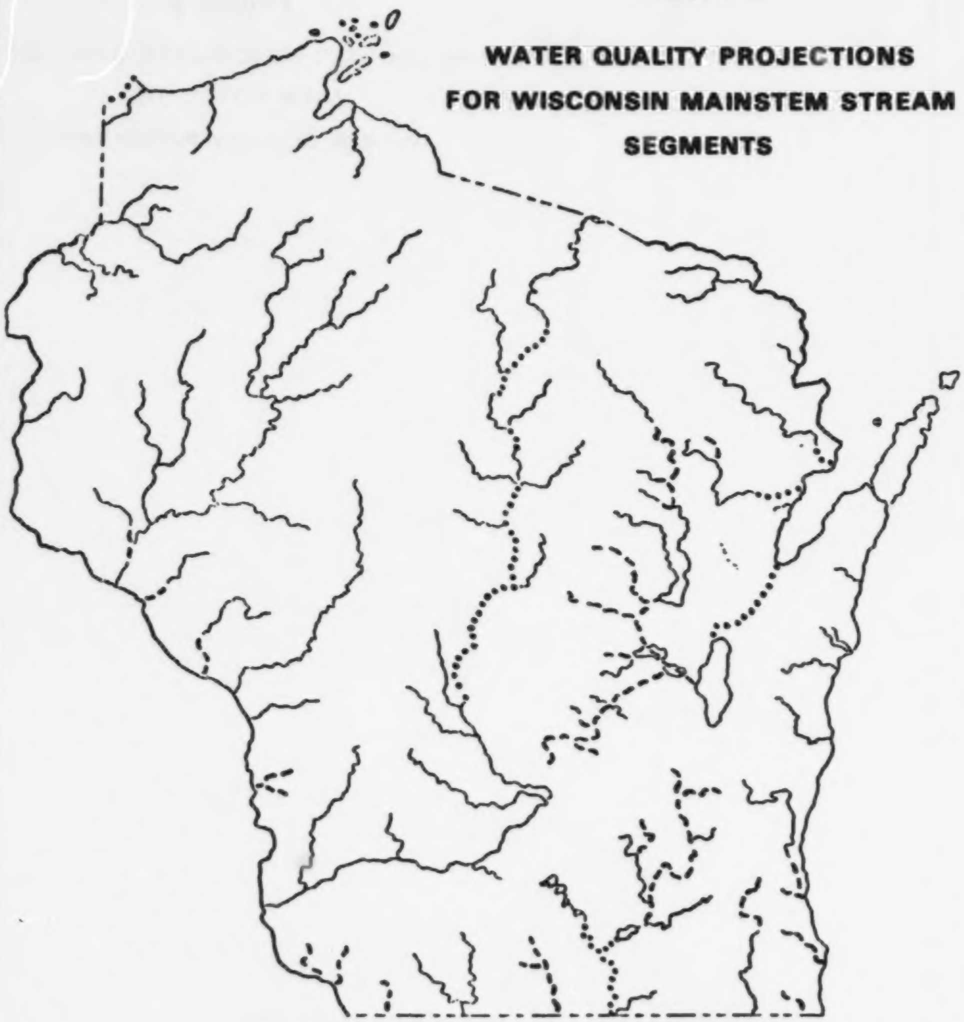
Wicsonsin administrative programs have been very successful in meeting the demands of the ambitious program outlined in PL 92-500. The Wisconsin Pollution Discharge Elimination System, the State permit program, is the heart of the facilities management program. Permits have been issued to 950 industries discharging to surface waters and groundwater discharge permits for 350 dischargers are presently being drafted. A total of 557 municipal dischargers have received permits. An enforcement program is being developed to assure compliance with permit limits while considering funding limitations. The construction grants program has been very successful in committing available Federal and State funds for treatment plant construction and rehabilitation. The greatest delay has been in completion of facilities planning requirements. Approximately five and one-half years of work is required for a municipality to complete this process and construct a plant. The facilities planning process includes infiltration/inflow analysis, sewer system evaluation, and a cost effectiveness analysis which includes an assessment of environmental effects of the project. The operator training and certification program, an area of facilities management that is becoming increasingly important as more complex facilities are built, has been expanded in recent years. Training courses are taught by Department district staff, local vocational schools and the University of Wisconsin Extension.

Water quality planning activities have been combined for the next few years, focusing on Section 208 areawide planning. Three agencies, the Southeast Wisconsin Regional Planning Commission, the Fox Valley Water Quality Planning Agency and the Dane County Planning Commission have been designated as areawide planning agencies. Planning for all nondesignated areas will be done by the Wisconsin Department of Natural Resources (DNR).

Several types of monitoring and surveillance activities provide the data base needed to conduct the State water quality program. Compliance with permit conditions is checked using self-monitoring reports submitted by facilities operators. Periodic 24-hour surveys provide verification of the accuracy of self-monitoring reports and allow district engineers to advise operating personnel as to how plant operation can be improved. Water quality surveillance activities include monthly sampling at 51 stations throughout the State, hourly sampling by automatic units at 11 locations on the Wisconsin and Fox Rivers, and detailed surveys of each drainage basin every four years. Additional detailed river surveys provide data needed to develop mathematical models of rivers for which wasteload allocations are needed.

FIGURE 2

WATER QUALITY PROJECTIONS FOR WISCONSIN MAINSTEM STREAM SEGMENTS



⁀ SEGMENTS MEETING CURRENT WATER QUALITY STANDARDS

⋯ SEGMENTS EXPECTED TO MEET CURRENT STANDARDS BY 1983

╌ SEGMENTS EXPECTED TO HAVE OCCASIONAL STANDARDS VIOLATIONS AFTER 1983

Wisconsin's inland lake renewal program is attempting to slow the ageing process of selcted lakes uisng innovative new techniques. Feasibility studies are done by consultants to determine if a lake is likely to respond to treatment. Projects are being implemented on five Wisconsin lakes thus far.

The objectives of Wisconsin's non-point source pollution control program are identification of pollutants, determination of impacts on water quality, proposal of remedial measures, evaluation of economic and social impacts of such measures, education of the public, and implementation of needed controls. The existing Soil Conservation Service program is able to fulfill a large part of the need for rural non-point source control, though their

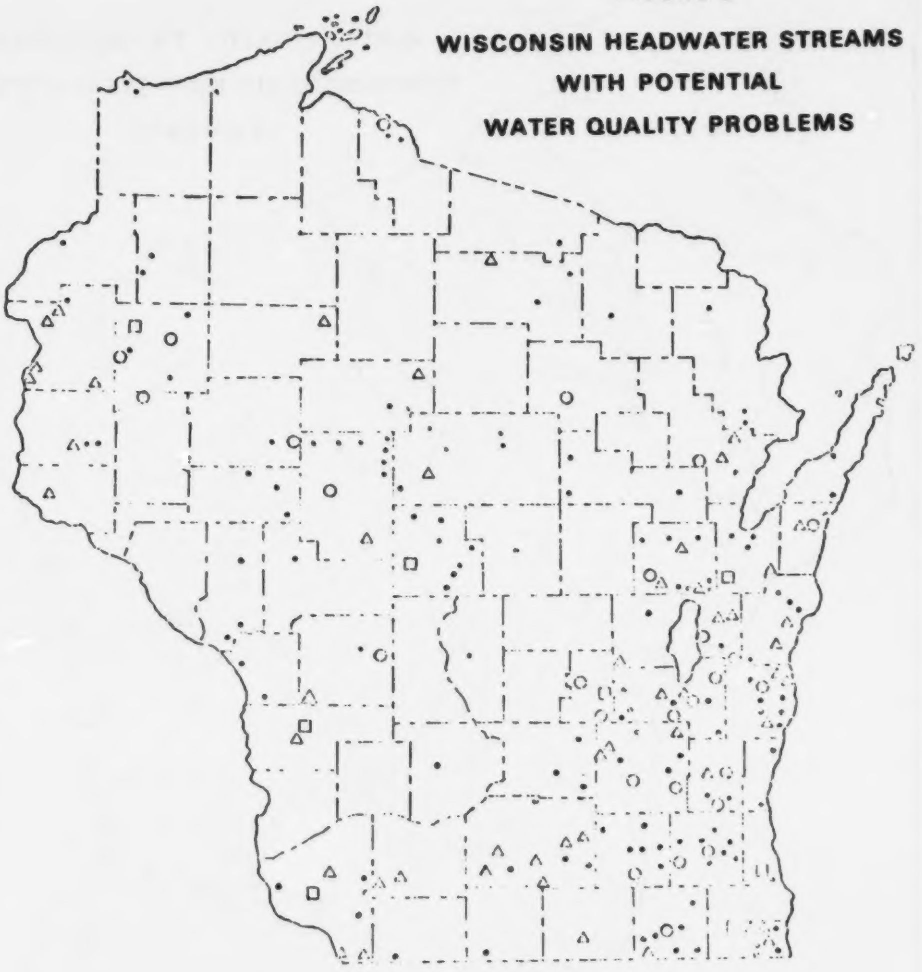


FIGURE 3

WISCONSIN HEADWATER STREAMS WITH POTENTIAL WATER QUALITY PROBLEMS

○ SEGMENTS EXPECTED TO MEET STANDARDS BY 1983
△ SEGMENTS NOT EXPECTED TO MEET STANDARDS IN 1983
□ SEGMENTS EXPECTED TO MEET STANDARDS OVER PORTIONS OF THEIR LENGTH
• NO PREDICTION MADE

programs are applied on a voluntary basis only. The Board of Soil and Water Conservation Districts will play an important role in developing the State non-point source program. The districts are participating in assessment of the magnitude of non-point source problems, and will provide needed local input in policy making.

Non-point source monitoring activities to date have been concentrated on a few areas with very intensive sampling for a wide range of pollutants. Projects are currently being conducted in the urbanizing Menomonee River basin, White Clay Lake in Shawano County, Washington County, and the red clay area of Ashland, Bayfield, Douglas and Iron Counties. Monitoring is to be expanded in 1976 with DNR district staff doing non-point source sampling instead of the normal basin surveys. Analysis of information collected and development of non-point source policies will be a major part of the Section 208 areawide planning process. In this way, regulatory policies can be developed, based on inputs from many disciplines and full public participation.

Nine municipal construction projects received Federal funding during 1975 representing a total investment of $77 million. This brings the total investment in Federal projects under PL 92-500 to $257 million for 21 facilities. State financing has allowed completion of 375 projects since 1970 with the State grant share totaling $102,880,523. Fiscal analysis of State grant programs indicates that a backlog of $428 million will exist in 1983 if Federal funding continues at the FY 1975 rate. If municipal needs through 1983 are to be met, Wisconsin's annual appropriation must be increased from $80 million to $100 million.

Costs for Wisconsin industries to meet 1977 standards are estimated at $324 million in capital investment and $47 million in O&M (1972 dollars) according to EPA's Economics of Clean Water—1973. A survey of Wisconsin industries during January of 1975 indicated few severe economic impacts through 13 plant closings are projected, caused in part by pollution control requirements. No closings of large plants or substantial loss of employment is expected. Predicted environmental impacts of 1977 requirements include production of an additional 332,000 tons per year of solid wastes and a 4 percent increase in industry energy use.

A study of recreational use of small polluted and clean streams was conducted during the summer of 1975. Owners of property adjacent to streams and people found using the streams were interviewed. Property owners were found to use polluted streams an average of 20 days per year per household and clean streams an average of 53 days per year per household. During the survey, 32 recreational users were encountered on clean streams and only six on polluted streams. From survey results, it is estimated that recreational benefits from improvement of small streams will be 700 hours per year per stream mile.

General recommendations to Congress have been developed by way of comments on the National Commission on Water Quality Staff Draft Report. Continuation of 1983 goals is urged to ensure continuing progress in our cleanup efforts and equitable treatment of all dischargers. Changes in the allocation formula for construction grants funds are recommended to allow more equitable distribution of funds. Greater emphasis on good operation and maintenance of treatment systems is needed and finally, further decentralization of authority to the States and steps to eliminate duplication of effort by the EPA and the States is recommended. Several more specific recommendations have been made by the Wisconsin staff (Section 3.4 of the report). It is our hope that decision makers will make time to consider these recommendations in detail.

APPENDIX A
Summary - State of Wyoming

Complete copies of the State of Wyoming 305(b) Report can be obtained from the State agency listed below:

Water Quality Division
Department of Environmental Quality
State Office Building West
Cheyenne, WY 82002

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Summary

An overall assessment of water quality in Wyoming would indicate the waters of the State are sustaining fish and wildlife suitable for recreation. Best available data indicate that there are very few pollution sources interfering with the production or maintenance of fish populations.

The State's water quality, based on 1975 data, is characterized by a general coliform problem attributed from natural runoff conditions and numerous municipal point source discharges. The lack of Section 201 construction funding will be a contraint in alleviating this condition.

Currently, 13 segments are not meeting Wyoming's Water Quality Standards, principally coliform. Eleven segments are not meeting the 1983 swimmable criteria as defined. Five of these segments are questionable in meeting the 1983 goals due to municipal wastewater discharges. Only two of the eleven segments are expected to meet the goals as a result of current municipal facility upgrading. It is expected that four segments will not meet the swimmable goal due in part to non-point source pollution.

The development of energy resources in Wyoming poses a potential for degradation of water quality in most areas of the State. Rapid population growth has created many problems with existing waste treatment facilities. New and expanded industrial development will continue to bring municipal and industrial pollution problems to certain regions. Increased resource development will necessitate additional surveillance and monitoring activities for those areas affected.

The major sources of non-point pollution in Wyoming comes from surface runoff and irrigation return flows. By comparison, other agricultural and industrial uses contribute little to the degradation of surface water quality. Produced water from oil field operations contribute salinity to some water courses, although impact has not been totally assessed. The State strategy for addressing control of non-point source pollution is based upon the development and implementation of best management practices which will be identified through the Section 208 planning process.

Some potential for eutrophication is evident on North Platte River segments below Casper, Lingle, and the Laramie River. The Section 201 construction program should help to eliminate this condition below Casper.

It is estimated that only half of the major industrial facilities in the State are meeting best practical treatment guidelines. Almost all of the oil well treaters have the facility capability to meet the standards. As of January 1, 1976, only ten municipal facilities are meeting 1977 secondary treatment standards.

Social-economic benefits associated with enhancement of degraded watercourses will be minimal, if any. Primary policy issues for the Water Quality Division remains with the preservation of existing high quality water and control of pollution in areas impacted by energy development.

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